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Palm Beach County, Florida

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This Draft EIS addresses proposed wastewater facilities for the City of Boca Raton, Florida and adjacent areas of unincorporated Palm Beach County. Ten wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the natural and human resources of the Southern Palm Beach County Area.

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Region 4
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Atlanta, GA 30365

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September 1981

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Draft

Wastewater Facilities
Southern Region Area
Palm Beach County, Florida

REPRODUCED BY
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U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
for
SOUTHERN REGION, PALM BEACH COUNTY, FLORIDA

Prepared by
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia 30365

This Draft EIS addresses proposed wastewater facilities for the City of Boca Raton, Florida and adjacent areas of unincorporated Palm Beach County. Ten wastewater management alternatives have been evaluated with particular attention to water quality in the area's surface and groundwater resources and the impacts of projected population growth on the natural and human resources of the Southern Palm Beach County area.

The comment period for the Draft EIS will remain open until November 25, 1981. Comments and inquiries should be forwarded to:

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Approved by

John A Little, Deputy for
Charles R. Jeter
Regional Administrator

September 1, 1981
Date

EXECUTIVE SUMMARY FOR THE ENVIRONMENTAL IMPACT STATEMENT

Southern Region Area Palm Beach County, Florida Wastewater Facilities

Draft (X)

Final ( )

Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, Georgia 30365

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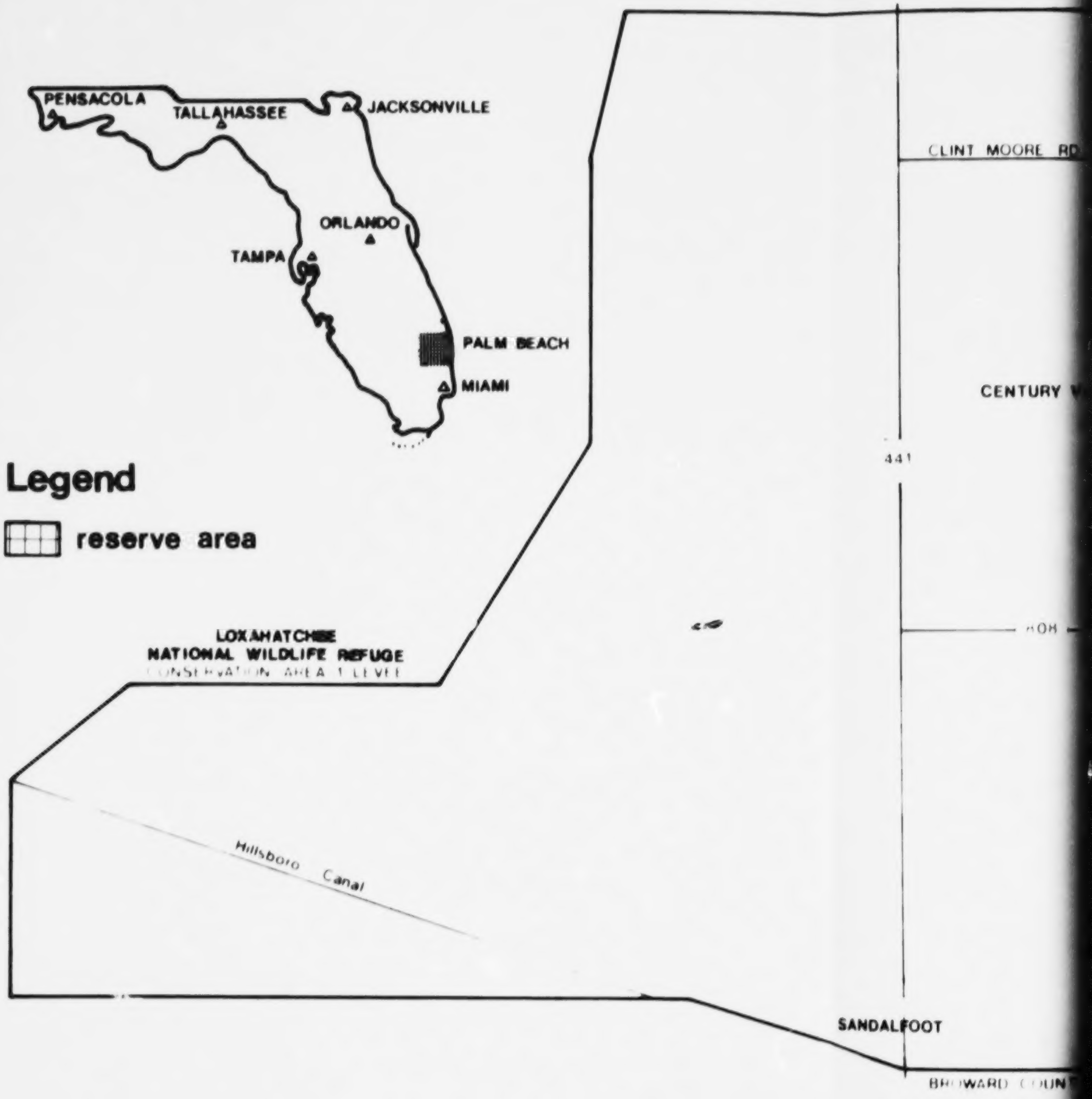
EXECUTIVE SUMMARY

Part A: Need For Action

This environmental impact statement (EIS) addresses alternatives for and impacts of the provision of wastewater management facilities in the the Southern Region Palm Beach County 201 Area. The Planning Area includes the City of Boca Raton and the area of Palm Beach County directly west of the City as shown in Figure 1. This EIS was initiated at the request of the City of Boca Raton which is the lead applicant in this 201 Planning Area. The City was concerned with the impact of projected growth supported by the project in the western portion of the Planning Area upon community services and facilities such as roads, schools, and public beaches. The City has been concerned with the issue of population densities for several years. In 1977, the City sued the County over this issue. The State court ruled in favor of the County land use control authority in its area of jurisdiction.

Most of the land in the County's portion of the Planning Area is classified by the Soil Conservation Service (SCS) as unique agricultural land. The County Land Use Plan supports the conversion of most of this land to urban uses.

Most of the land in the Planning Area is underlain by the Biscayne Aquifer. EPA recently designated the Biscayne Aquifer and its tributaries as a "sole source aquifer" under provisions of the Safe Drinking Water Act.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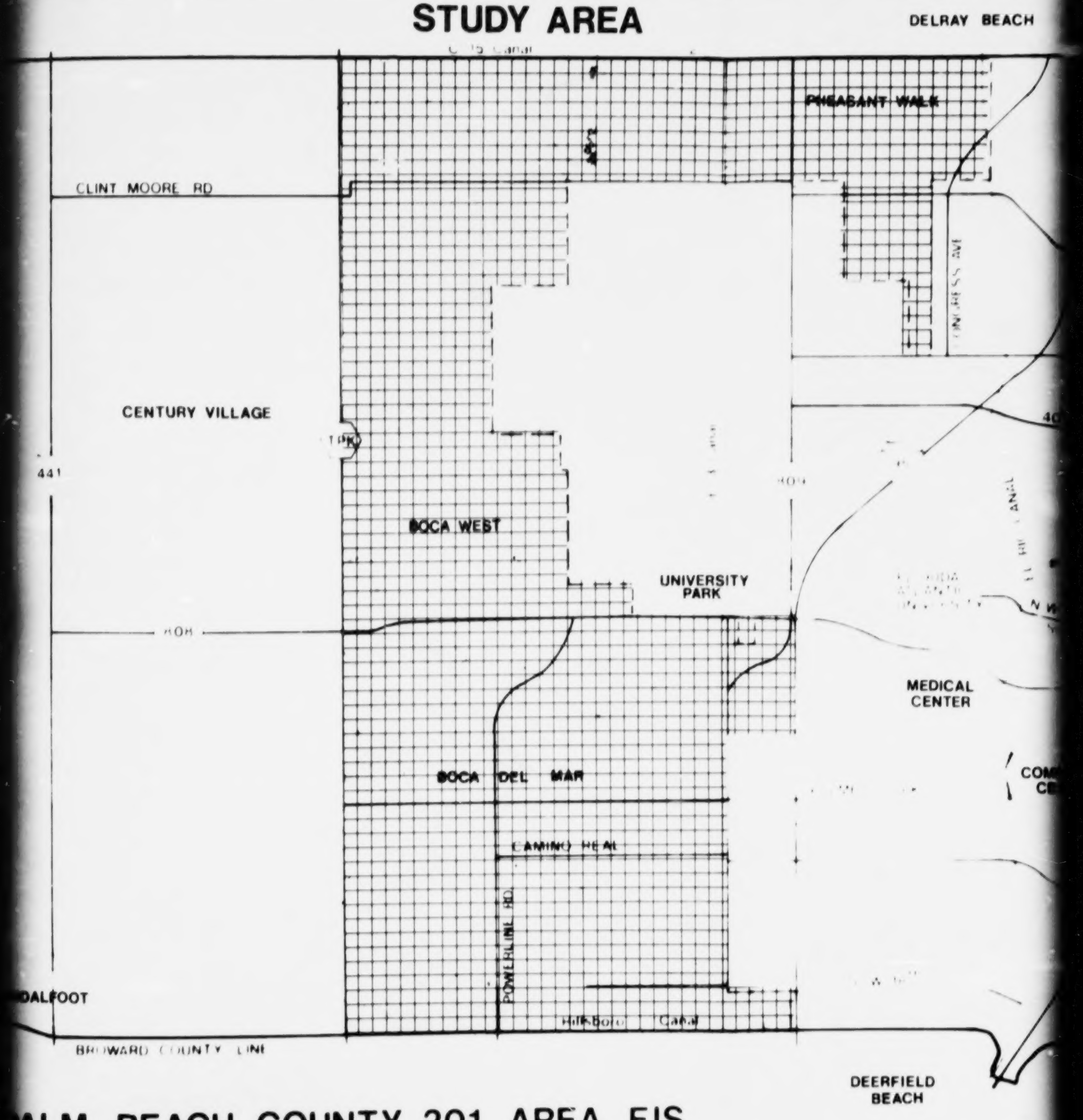
STUDY AREA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ALM BEACH COUNTY 201 AREA EIS

DY AREA

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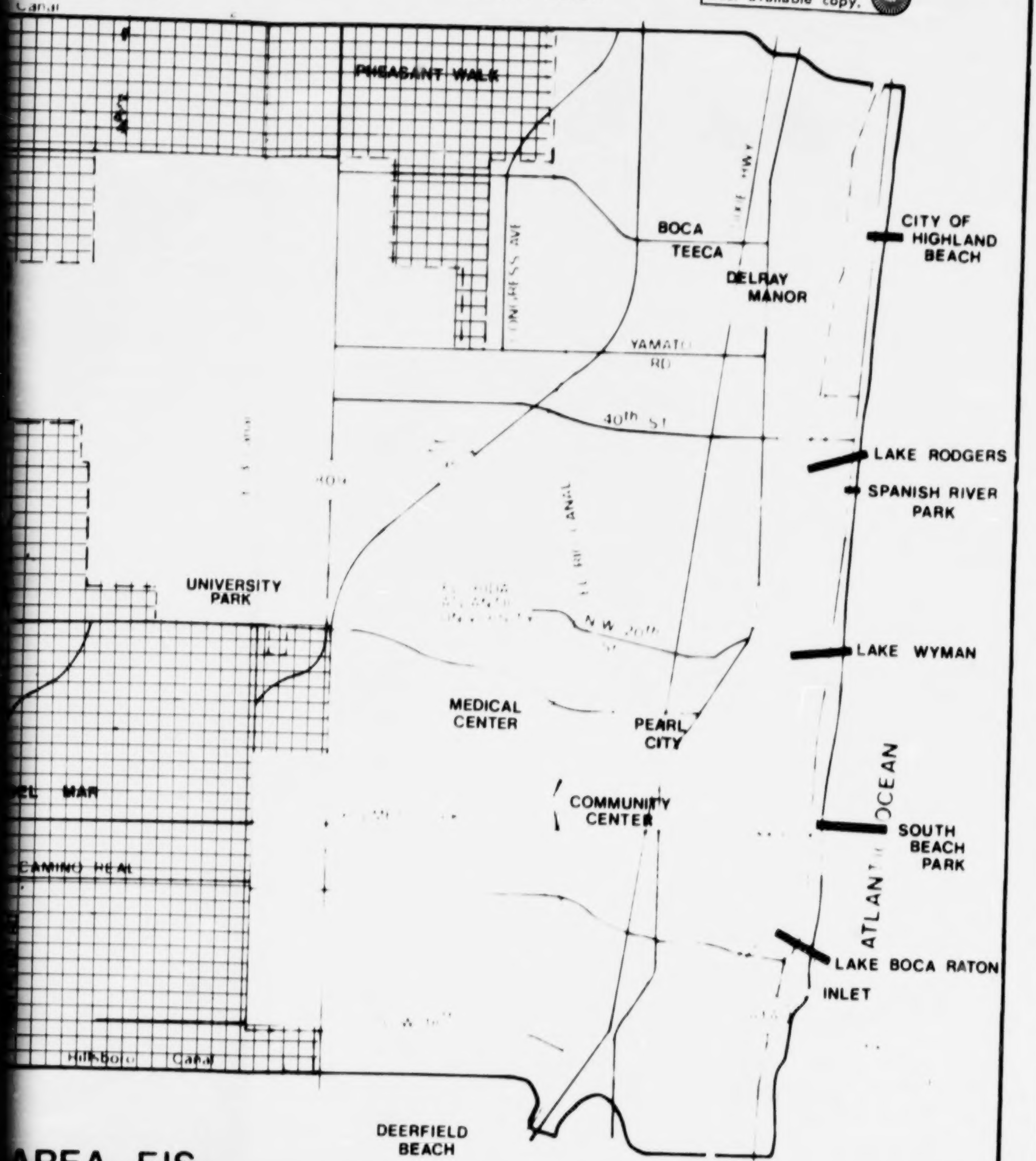
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LAKE BOCA RATON
INLET
Hillsboro Canal
DEERFIELD
BEACH

AREA EIS

Sewerage facilities which currently service the Planning Area are provided by the City of Boca Raton and Palm Beach County. The area is experiencing extensive growth and development which will soon begin to tax the capabilities of the existing treatment and disposal systems. This EIS addresses the planning undertaken to determine the needed wastewater facilities and their probable impact on the environment.

Part B: Description of Alternatives

Feasible alternatives were developed by combining wastewater service configurations and treatment and disposal techniques. Proposed systems for sludge treatment and disposal are not addressed at this time. The evaluation of alternatives for sludge management is still underway and will be in the Final EIS. The remainder of this section presents a description of each of the alternatives for wastewater treatement and disposal.

Alternative 1:

Alternative 1 consists of one regional facility with year 2000 capacity of 29 million gallons per day (MGD) located at the existing site of the Glades Road Plant to provide service for the entire Planning Area. This would require an increase of 19 MGD over the current capacity of 10 MGD. An activated sludge process, providing a secondary level of treatment followed by chlorination, would be used. Effluent disposal would be accomplished through the existing ocean outfall.

Alternative 2:

Alternative 2 consists of one regional treatment facility at the site of the Glades Road Plant. This plant would provide service for the entire Planning Area. Effluent disposal would be a combination of ocean outfall and spray irrigation. Based on the screening process performed as part of this study, spray irrigation would be limited to golf courses, parks, and open areas.

Alternative 3:

Alternative 3 consists of one regional facility located at the Glades Road Plant. This plant would provide service to the entire Planning Area except for subbasins F and I which would be served by on-site systems. Treatment and disposal would be the same as for Alternative 1 with a decrease in capacity of 2 MGD.

Alternative 4:

Alternative 4 consists of two regional plants. The Glades Road Plant capacity would be increased to 21 MGD from its existing 10 MGD. The treatment and the disposal technique used would be the same as for Alternative 1. This plant would serve subbasins A, B, and F.

A West Regional Plant would be constructed. This plant would employ activated sludge and chlorination attaining secondary treatment. The plant would be designed with a capacity of 9 MGD. Effluent disposal would consist of deep well injection. This plant would serve subbasins C, D, E, I, G, and H.

Alternative 5:

This alternative consists of two regional treatment facilities. One regional treatment facility would be the existing Glades Road Plant expanded to 21 MGD.

A West Regional Plant would also be constructed. Effluent from the plant would be disposed through spray irrigation. Also, the plant would be connected to the Glades Road Plant via a 30-inch outfall. This outfall could transport flow into the Glades Road Plant where it could be ultimately disposed of by ocean outfall. The outfall would serve as a backup to the spray irrigation system proposed for the West Plant.

Alternative 6:

This alternative consists of three regional treatment facilities located at Glades Road, Sandalfoot Cove, and American Homes. Treatment capacity at Glades Road would increase from 10 to 17.5 MGD. Treatment capacity at Sandalfoot would increase from 3 to 6 MGD. American Homes capacity would increase from 1.5 to 6 MGD. Disposal of wastewater from all three treatment facilities would be by ocean outfall. A 30-inch diameter line would be required to convey treated effluent eastward.

Alternative 7:

Alternative 7 consists of one regional plant at Glades Road with the same type of treatment, capacity, discharge, and pumping station configuration as Alternative 1. No centralized service would be provided to the land classified as unique agricultural land. Densities in the other parts of the County service area were assumed to increase so the total population level would be the same as for the other alternatives.

Alternative 8:

This alternative is the no Federal action alternative in which no Federal 201 grant money would be given for construction in the Planning Area. It is estimated that the City and the County would expand the existing facilities in the area with 100% local funding if this alternative is chosen. This would mean expansion of the Glades Road Plant to 17.5 MGD to serve the City's service area. The three County plants would probably remain in service until their capacities were reached between 1988 and 1990. These plants could then be expanded to 6 MGD each at Sandalfoot and American Homes and 0.7 at Pheasant Walk with discharge to percolation ponds or to the City's ocean outfall. A third alternative for the County would be pumping all wastewater to the Glades Road Plant for treatment and disposal. An agreement would have to be reached between the City and County concerning the appropriate option for implementation.

Alternative 9:

Alternative 9 is designed to serve as a potential disposal option which could be used in conjunction with any of the other alternatives. Disposal would be by means of a dual water system for residential irrigation.

Alternative 10:

Alternative 10 consists of constructing a system with configuration, treatment level and type of disposal identical to Alternative 1. The pump station, force main to the Glades Road Plant, and the ultimate size of the treatment plant would be downsized so as not to serve that part of the population projected to settle on unique agricultural lands as defined by the SCS.

Part C: Evaluation of Alternatives

The alternatives described in Part B were evaluated in terms of cost, environmental impact and implementability. The evaluation of the alternatives with respect to these categories is summarized in Table 1.

TABLE I
ALTERNATIVES EVALUATION SUMMARY

Alternative Number	Description of Alternative	Total Present Worth ($millions)	Environmental Effects	Implementability
1	1. 1 plant 2. ocean outfall	26.80	1. No discharges to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. Conversion of most unique agricultural lands to urban uses. 5. Continued and expanded strain on community services & facilities. 6. Not in conformance with County Comprehensive Plan for Subbasins F & I. 7. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to treat & dispose of County wastewater.
2	1. 1 plant 2. ocean outfall & spray irrigation	39.60	1. Continued successful use of the ocean outfall. 2. Some recycling of treated wastewater. 3. Conversion of most unique agricultural lands to urban uses. 4. Continued & expanded strain on community services & facilities. 5. Not in conformance with County Comprehensive Plan for Subbasins F & I. 6. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to treat & dispose of County wastewater.
3	1. 1 plant 2. ocean outfall 3. no service to subbasins F & I	33.21	1. No discharges to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. Conversion of most unique agricultural lands to urban uses. 5. Continued & expanded strain on community services & facilities. 6. This Alternative is in conformance with County Comprehensive Plan recommendation not to serve Subbasins F & I. 7. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to treat & dispose of County wastewater.

TABLE I
ALTERNATIVES EVALUATION SUMMARY

Alternative Number	Description of Alternative	Total Present Worth ($millions)	Environmental Effects	Implementability
4	1. 2 plants 2. ocean outfall & deep well injection	36.25	1. Adverse effects to groundwater undetermined until test well could be implemented. 2. Continued successful use of ocean outfall. 3. Possible recycling of deep well effluent at a later date. 4. Conversion of most unique agricultural lands to urban uses. 5. Continued and expanded strain on community services & facilities. 6. Not in conformance with County Comprehensive Plan for Subbasins F & I. 7. Increased urban runoff to Biscayne Aquifer.	No new agreements or interaction needed between City & County.
5	1. 2 plants 2. ocean outfall & spray irrigation	48.98	1. Continued successful use of the ocean outfall. 2. Some recycling of treated wastewater. 3. Conversion of most unique agricultural lands to urban uses. 4. Continued & expanded strain on community services & facilities. 5. Not in conformance with County Comprehensive Plan for Subbasins F & I. 6. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to dispose of County wastewater.
6	1. 3 plants 2. ocean outfall	34.43	1. No discharges to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. Conversion of most unique agricultural lands to urban uses. 5. Continued & expanded strain on community services & facilities. 6. Not in conformance with County Comprehensive Plan for Subbasins F & I. 7. Increased urban runoff to Biscayne Aquifer.	Agreement needed between City & County outlining terms of City agreement to dispose of County wastewater.

TABLE I
ALTERNATIVES EVALUATION SUMMARY

Alternative Number	Description of Alternative	Total Present Worth ($milions)	Environmental Effects	Implementability
7	1. 1 plant 2. ocean outfall 3. no service to agricultural lands	26.80	1. No discharge to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. No more conversions of unique agricultural lands to urban uses. 5. Continued & expanded strain on community services & facilities. The higher densities & decreased sprawl associated with this Alternative will lessen the costs needed to construct additional services & facilities. 6. Increased urban runoff to Biscayne aquifer.	Agreement needed between City & County outlining terms of City agreement to treat and dispose of County wastewater.
8	1. 4 plants 2. ocean outfall & percolation ponds	34.99	1. No Federal funding to service growth & development. 2. No Federal funding to encourage the conversion of unique agricultural lands to urban uses. 3. No Federal funding to encourage increased strain on the area's community services & facilities. 4. Continued discharge to Biscayne Aquifer from percolation ponds. 5. No Federal encouragement of increased urban runoff to Biscayne Aquifer.	No new agreements needed in first phase. Second phase may require agreement by City to treat & dispose of County wastewater.
9	1. Dual water supply system	*	1. Maximum water recycling. 2. Other impacts depend upon what other alternatives this one is supplementing.	Residents may express concern over direct recycle.
10	1. 1 plant 2. ocean outfall 3. no service to agricultural lands	21.80	1. No discharge to Biscayne Aquifer. 2. Continued successful use of the ocean outfall. 3. No water recycling. 4. No funding for conversion of unique agricultural lands to urban uses. 5. The Alternative supports less additional strain on the area's community services & facilities than the full service alternatives.	Agreement needed between City & County outlining terms of City agreement to treat & dispose of County wastewater.

*Exact cost not calculated for Alternative 9. This Alternative includes a distribution system for treated wastewater for residential and other purposes as used in St. Petersburg, lorida. The total costs would exceed those of disposal by an outfall or conventional spray irrigation. (supplements

Cost

As shown in Table 1, there are significant differences among the alternatives with regard to cost ($26.8 million to $48.98 million for the full service alternatives). Alternative 10 costs only $21.8 million. However, this alternative does not provide service for the full 20 year population projection. These figures clearly indicate that the alternatives involving spray irrigation are more expensive than those associated with the outfall. This is due to the high cost of land in the area and the fact that the outfall is already in existence.

Alternatives 1 and 7 are listed as the most cost effective with a total present worth cost of $26.8 million. These figures, however, are somewhat misleading when compared to Alternatives 3 and 8 which have present worth costs of $33.2 and $34.9 million respectively. The difference in the cost calculations results from the fact that alternatives 1 and 7 provide service to subbasins F and I while Alternatives 3 and 8 do not. A $1,000 cost is estimated per septic tank user in the two subbasins in Alternatives 3 and 8 while no cost for collector lines is assessed to the same users in Alternatives 1 and 7. When the difference in cost calculations for these two subbasins is accounted for, the cost of these four alternatives are almost identical.

Environmental Impacts

Provision of service throughout the unincorporated portion of the Planning Area would promote the conversion of most of the area's unique agricultural lands to urban uses. Alternatives 7, 8 and 10 do not impact these agricultural lands. However, County land use policy supports the conversion of most of these lands to urban uses. It is doubtful that the lack of Federal funds for wastewater treatment and disposal will alter this policy.

The large increases in population levels projected for the Planning Area will lead to increased strain on the already overcrowded system of community services and facilities. County land use policy indicates that these population levels will be reached no matter which alternative is selected. Alternatives 8 and 10 would not provide Federal funding to promote this growth and development.

The Biscayne Aquifer is the principal source of drinking water supply in the area. It has been declared a sole source aquifer under provisions of the Safe Drinking Water Act. Alternative 8 is the only alternative which will maintain the existing percolation ponds discharging into the aquifer. Current monitoring data collected by the Florida Department of Environmental Regulation and the Palm Beach County Health Department do not indicate any water quality problems associated with these discharges. The large population increase projected for the area will increase the runoff associated with urban land use such as heavy metals, and lawn fertilizers. Runoff from agricultural fertilizers should decrease as more agricultural lands are converted to urban uses.

The demand on the area's potable water resources will continue to expand with the increase in population. Alternatives 2, 4, 5, 8 and 9 involve some form of recycling. The other alternatives discharge all wastewater through the ocean outfall.

Implementability

Most of the alternatives require an agreement between the City and the County outlining terms of Boca Raton's agreement to treat and dispose of Palm Beach County's wastewater. All alternatives require such agreements except Alternatives 4 and 8. It is expected that equitable arrangements could be worked out between these two local governing bodies.

Part D: Description of Preferred Alternative

EPA has selected a modification of the no Federal action alternative, Alternative 8, as the preferred alternative for the Draft EIS. This alternative is shown in Figure II-13. EPA would fund the expansion of the Glades Road facility to 17.5 MGD to serve subbasin A. This alternative would have a present worth cost of approximately $13.2 million.

EPA would not fund any expansion in the County portion of the Planning Area. Capacity currently exists at the Sandalfoot Cove, American Homes, and Pheasant Walk Plants to last until 1988-1990. These plants could then be expanded to 6 MGD each at Sandalfoot Cove and American Homes and 0.7 MGD at Pheasant Walk with discharge to percolation ponds or to the City's ocean outfall. A third alternative for the County would be pumping all wastewater to the Glades Road Plant for treatment and disposal. An agreement would have to be reached between the City and the County concerning the appropriate option for implementation.

As part of this EIS, EPA is initiating a more detailed monitoring program to determine the impacts of the percolation ponds on the Biscayne Aquifer. The Plan of Study for this sampling program is presented in Appendix A in this Draft EIS. The results of this study will be presented in the Final EIS.

Florida DER and the Palm Beach County Health Department will continue their monitoring programs at the percolation ponds and water supply wells in the future. If a buildup of nitrate levels becomes evident, an alternate form of wastewater disposal may become necessary. In this eventuality, Federal funding may be available to address this need.

Part E: Basis for Decision

The underlying theme of this EIS is the selection of a wastewater management program for the Southern Region of Palm Beach County that is compatible with the protection of the area's sensitive resources, particularly the unique agricultural lands and the Biscayne Aquifer, while recognizing the existing extensive development pressure. In light of projected impacts of growth and development in the Planning Area and the demonstrated lack of existing water quality problems, EPA selected the modified no action approach described above as the preferred alternative. Local land use policy is the appropriate means for accomplishing protection and development of the resources in the Planning Area.

DRAFT ENVIRONMENTAL IMPACT STATEMENT
SOUTHERN REGION, PALM BEACH COUNTY, FLORIDA

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CHAPTER I - PURPOSE AND NEED FOR ACTION

The Southern Region Palm Beach County 201 Facilities Planning Area Environmental Impact Statement is being prepared to address the provision of wastewater facilities for the City of Boca Raton and a portion of Palm Beach County. Sewerage facilities which currently service the Planning Area are provided by the City of Boca Raton and Palm Beach County. The area is experiencing extensive growth and development which will soon begin to tax the capabilities of the existing treatment and disposal systems. This EIS addresses the planning undertaken to determine the needed wastewater facilities and their probable impact on the environment.

This Planning Area is located on the southeastern coast of Florida as shown in Figure 1. This EIS is being undertaken concurrently with the development of the 201 Plan. Through this process, the two separate consultants are hired to do the EIS and the 201 Plan respectively. The Plans of Study and the two reports were coordinated to avoid duplication. In the alternatives evaluation, the EIS consultant preformed the environmental evaluation while the 201 consultant did the cost analysis. The City of Boca Raton Palm Beach County, the Florida Department of Environmental Regulation (DER) and EPA have all worked together throughout this process to direct the two studies. Major outputs of the 201 Plan are available concurrently with the issuance of this Draft EIS. The Final EIS will be issued with the approval of the completed 201 Plan. The boundaries of the Planning Area were established by the Florida Department of Environmental Regulation. The Planning Area was divided into the County service area and the Boca Raton service area for planning purposes.

The major population center within the Planning Area is the City of Boca Raton. The 1980 population estimate of the City's service area is 62,596. Interceptor and collector systems are present throughout most of the developed portions of this area. Wastewater is treated at the City of Boca Raton's treatment facilities located on Glades Road. This facility provides secondary treatment with the treated effluent discharged into the Atlantic Ocean. Scattered areas in the City are served by septic tanks. The existing wastewater treatment facilities in the Planning Area are shown on Figure 1-1.

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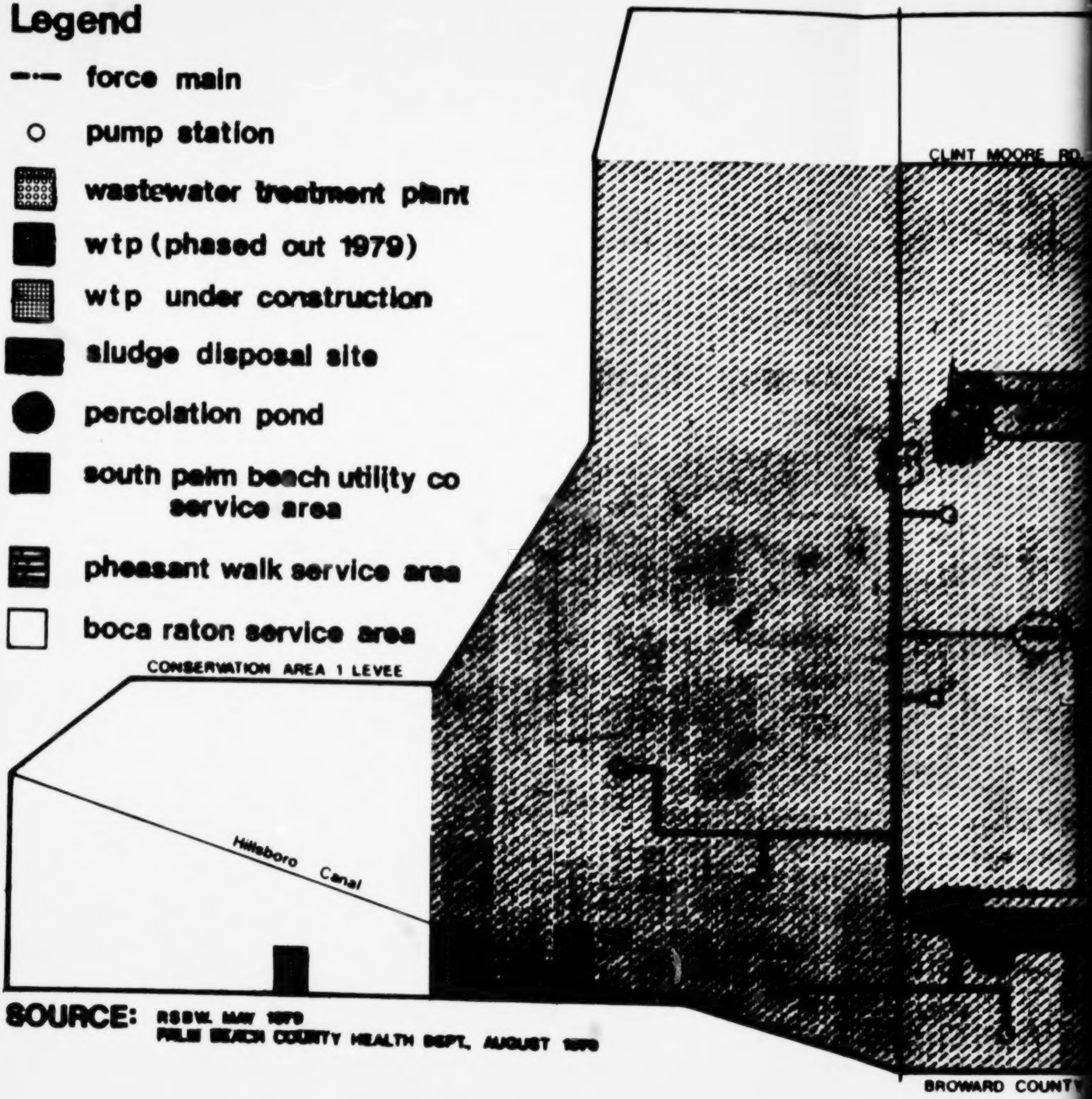
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force main
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wtp (phased out 1979)
wtp under construction
sludge disposal site
percolation pond
south palm beach utility co service area
pheasant walk service area
boca raton service area
CLINT MOORE RD.
CONSERVATION AREA 1 LEVEE
Hillsboro Canal
BROWARD COUNTY

SOURCE: RSBW. MAY 1979
PALM BEACH COUNTY HEALTH DEPT., AUGUST 1979

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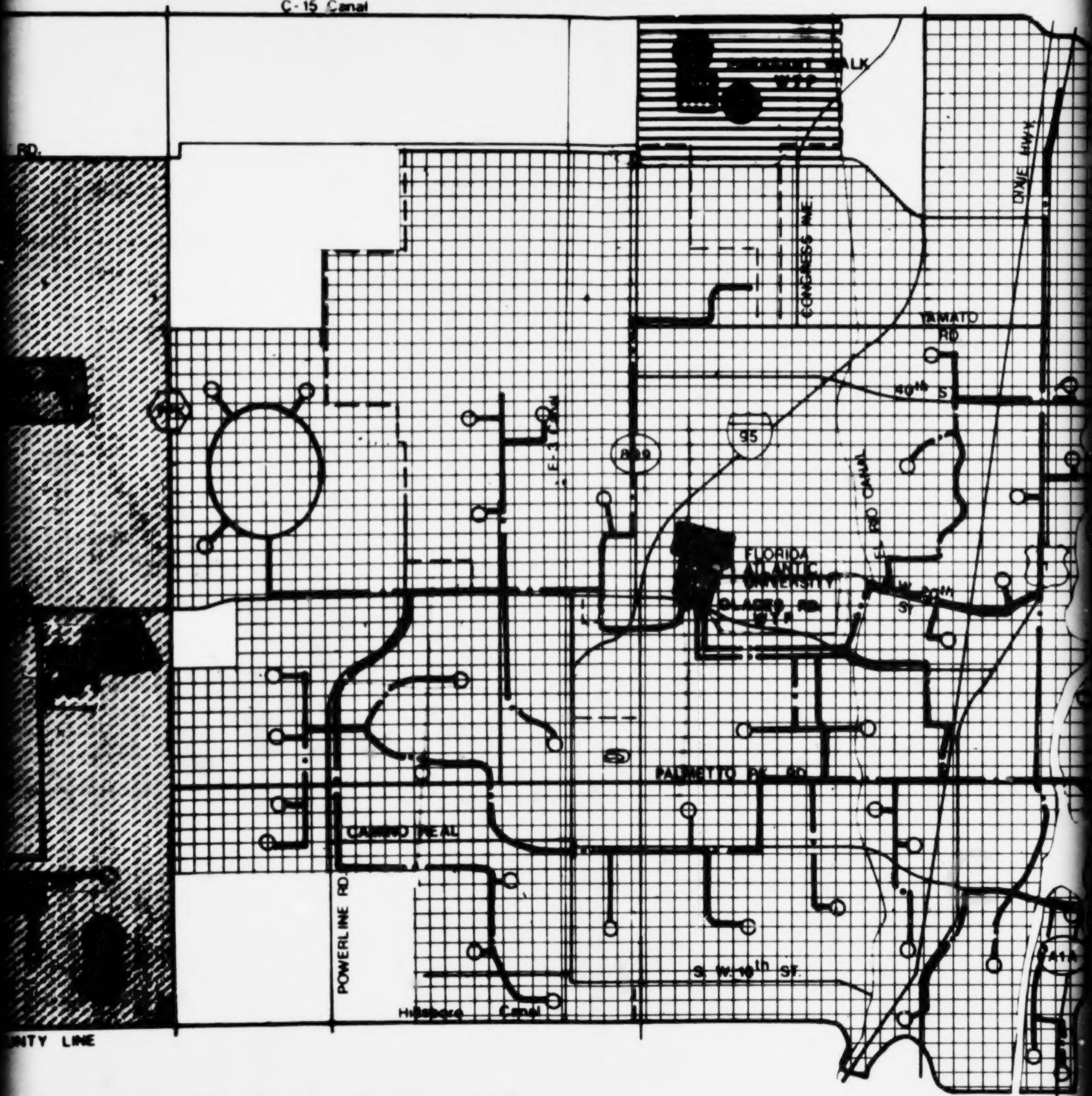
WASTEWATER TREATMENT FACILITIES



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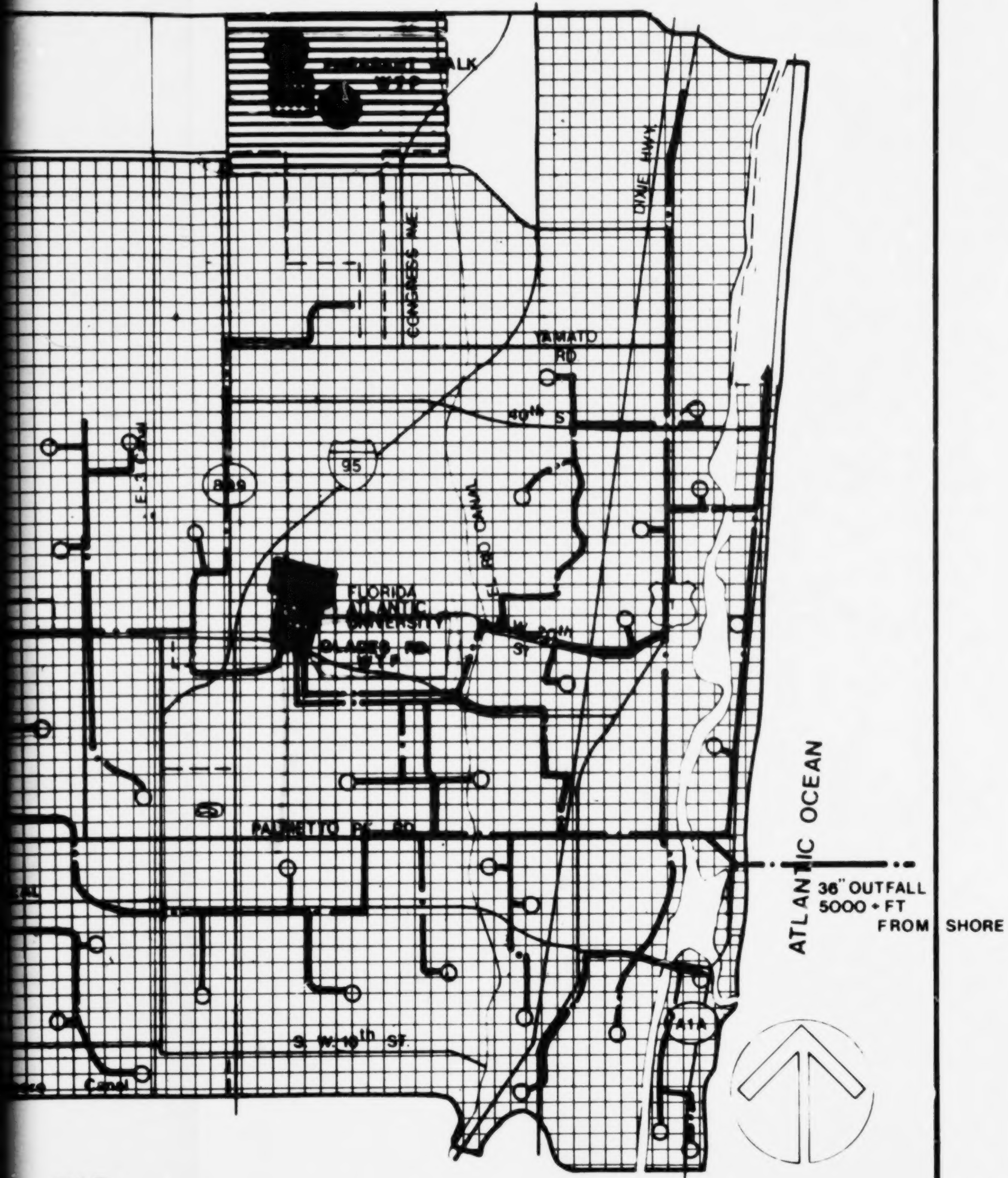
GLADES RD
NW 20th ST
PALMETTO PK RD
CAMINO REAL
POWERLINE RD
S.W. 18th ST
Hillsboro Canal
UNTY LINE
A1A

CH COUNTY 201 AREA EIS

MENT FACILITIES


WALK
WTP
CONGRESS AVE
DIXIE HWY
YAMATO RD
40th ST
95
809
E-3 Canal
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
GLADES RD
W 20th ST
PALMETTO PK RD
ATLANTIC OCEAN
36" OUTFALL
5000 + FT
FROM SHORE
S. W. 18th ST.
A1A
Canal

A EIS

fig II-1

The Palm Beach County service area had a 1980 population estimate of 13,557. Until recently, the South Palm Beach Utilities Corporation (SPBUC) provided most of the wastewater service in this part of the Planning Area with a collection system leading to two small plants both of which provide secondary treatment with discharge to percolation ponds. The County recently purchased the SPBUC and will now operate these facilities along with the Pheasant Walk Plant which also provides secondary treatment with discharge to percolation ponds.

The Palm Beach County Health Department will approve septic tanks at a density of one per acre where a private well is present and one per half acre where no well is present. Scattered homes and low density residential developments throughout the County are served by septic tanks.

The Clean Water Act of 1977, represents the major legislative action for water pollution abatement in the United States. Under this legislation the U.S. Environmental Protection Agency has been given responsiblity for the administration of the law including the funding of wastewater facilities.

The principal mechanism in P.L. 95-217 which provides for the construction of municipal wastewater treatment plants is Section 201. This section provides grant funds for planning, design and construction of wastewater facilities. Under the provisions of Section 201 any wastewater facility which is newly proposed or under consideration for upgrading and/or expanding which will use federal funds for construction must first proceed with a 201 Facilities Planning Study.

In 1978, EPA granted Step I funding for preparation of the Southern Region Palm Beach County Area 201 Facilities Plan. The City of Boca Raton has been coordinating the 201 Facilities Plan for the Planning Area. Camp, Dresser, & McKee of Fort Lauderdale, Florida is preparing the 201 Plan.

EPA made the decision to prepare an EIS in conjunction with the 201 Facilities Plan for several reasons. These reasons included a request by the City of Boca Raton and the potential adverse impacts of projected population and development. Stottler & Stagg was authorized to begin preparation of the EIS in February, 1979.

This EIS is being done to comply with the provisions of the National Environmental Policy Act of 1969, Public Law 91-190. The purpose of this act is to encourage all Federal agencies to direct their policies, plans, and programs to protect and enhance environmental quality. To comply with this Act, Federal agencies, in consultation with the public and other Federal, State, and local agencies, will assess in detail the potential environmental impacts of all major Federal actions significantly affecting the quality of the human environment.

The objective of the EIS and 201 Facilities Plan process is the selection of the most cost-effective, environmentally sound, socially acceptable and implementable wastewater management system for the Planning Area. To meet this objective, certain major goals were determined to be significant.

1. Preservation of the area's unique natural resources.
2. Implementation of the Florida Local Government Comprehensive Planning Act throughout the Planning Area.
3. Ensure that water quality standards are achieved and prevent any further degradation of surface water quality.
4. Protection of potable water supplies.
5. Ensure the availability of adequate public facilities and services for future populations.
6. Reuse of treated wastewater.
7. Maintenance of the quality of life.
8. Avoidance of undue financial burden on the community.
9. Increase cooperation among Federal, State, and local units of government within the Planning Area.

Public participation was encouraged throughout the 201 planning process through the establishment of a Citizens Review Commmittee, public meetings, and local news coverage. The Review Committee included representatives of all local governments, environmental groups, regional regulatory and planning agencies and private citizens. Meetings of the Review Committee were held at key intervals in the planning process and committee members were provided with a series of Task Reports which presented detailed information on principal parts of the study. Following the selection of a recommmended plan, a public meeting was held to afford interested citizens an opportunity to comment on the plan.

CHAPTER II - ALTERNATIVES DEVELOPMENT AND COST EVALUATION

Part A: Introduction

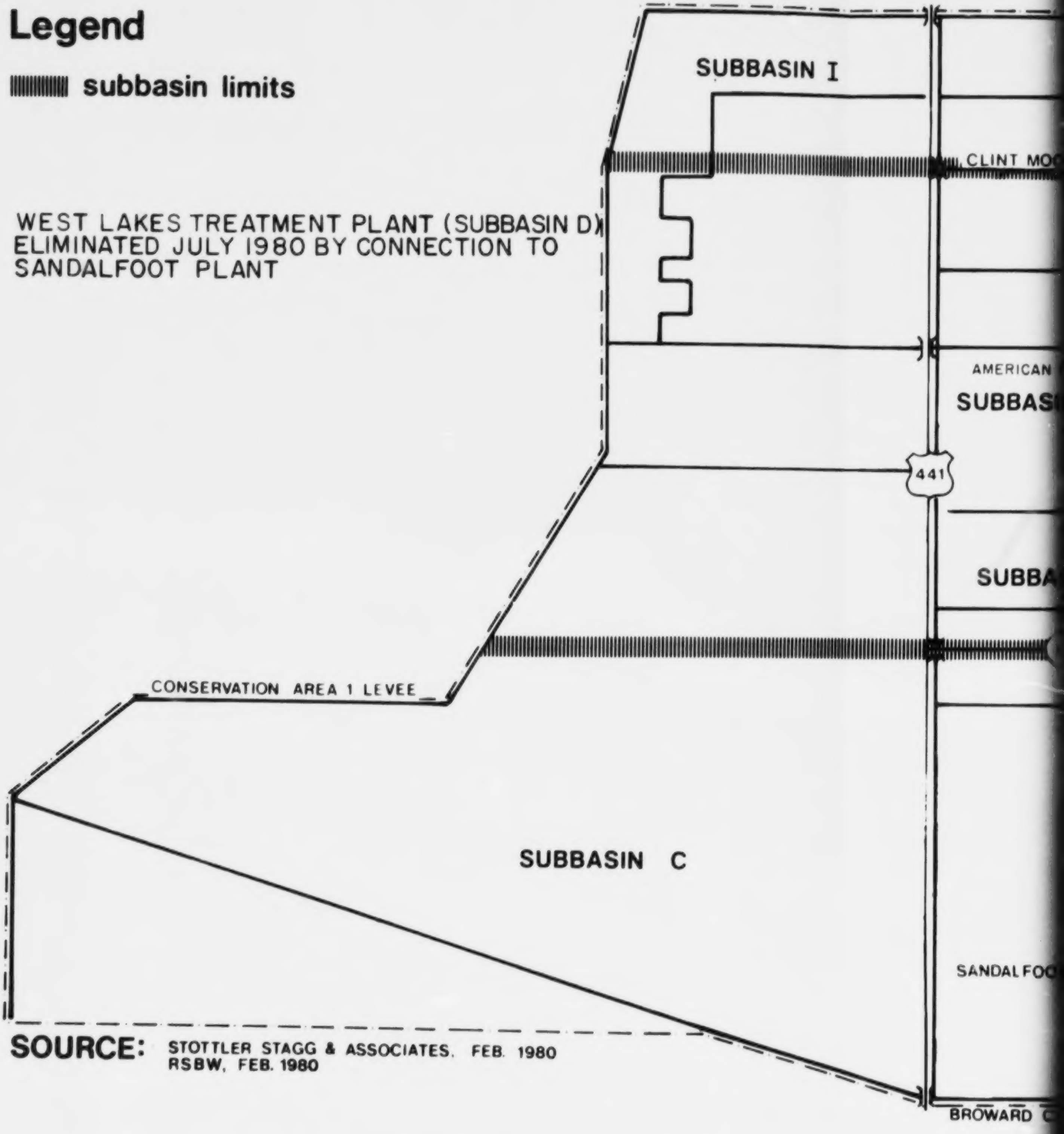
The purpose of this chapter is to provide a systematic development of all reasonable alternatives for the attainment of the objectives of this project. The alternatives are then compared and critical differences identified. A preferred alternative is then selected.

This chapter presents a range of structural engineering alternatives and non-structural considerations for the solution of wastewater management problems. In addition, alternatives are evaluated for their relative cost and implementability. The environnmental evaluation of the alternatives is presented in Chapter III. The structual alternatives identified include the construction of new wastewater treatment and conveyance facilities or the upgrading of existing facilities. Non-structual wastewater considerations discussed include optimum use of existing facilities, flow and waste reduction measures, land and development controls.

EPA regulations require the use of population projections developed and approved for the Areawide Wastewater Management Plan (208 Plan) in the 201 planning process. Projections made in April, 1979 have been approved by the City, County, FDER and EPA. These projections indicate that the total population within the Planning Area will increase from 76,153 in 1980 to 257,566 in 2000. These projections have been disaggregated to the service area subbasins shown in Figure II-1 for the purpose of developing flow projections. The per capita flow projections to be used are 89 and 100 gallons per capita per day (gpcd) for the areas east and west of the Turnpike, respectively. Total wastewater quantities estimated for the year 2000 are approximately 18 MGD in the Boca Raton service area and approximately 10 MGD in the County service area.

The needs and expenditures for wastewater facilities could be substantial and, therefore, many technically feasible alternatives were evaluated for immediate and future requirements throughout the planning period.

All potential alternatives were evaluated based on capital and annual costs. The costs evaluations identified several cost-effective alternatives for the Boca Raton service area and the County service area. The cost-effective alternatives were evaluated further with respect to overall economic, environmental, and administrative and implementative characteristics to select the recommended plan.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WEST LAKES TREATMENT PLANT (SUBBASIN D)
ELIMINATED JULY 1980 BY CONNECTION TO
SANDALFOOT PLANT
AMERICAN
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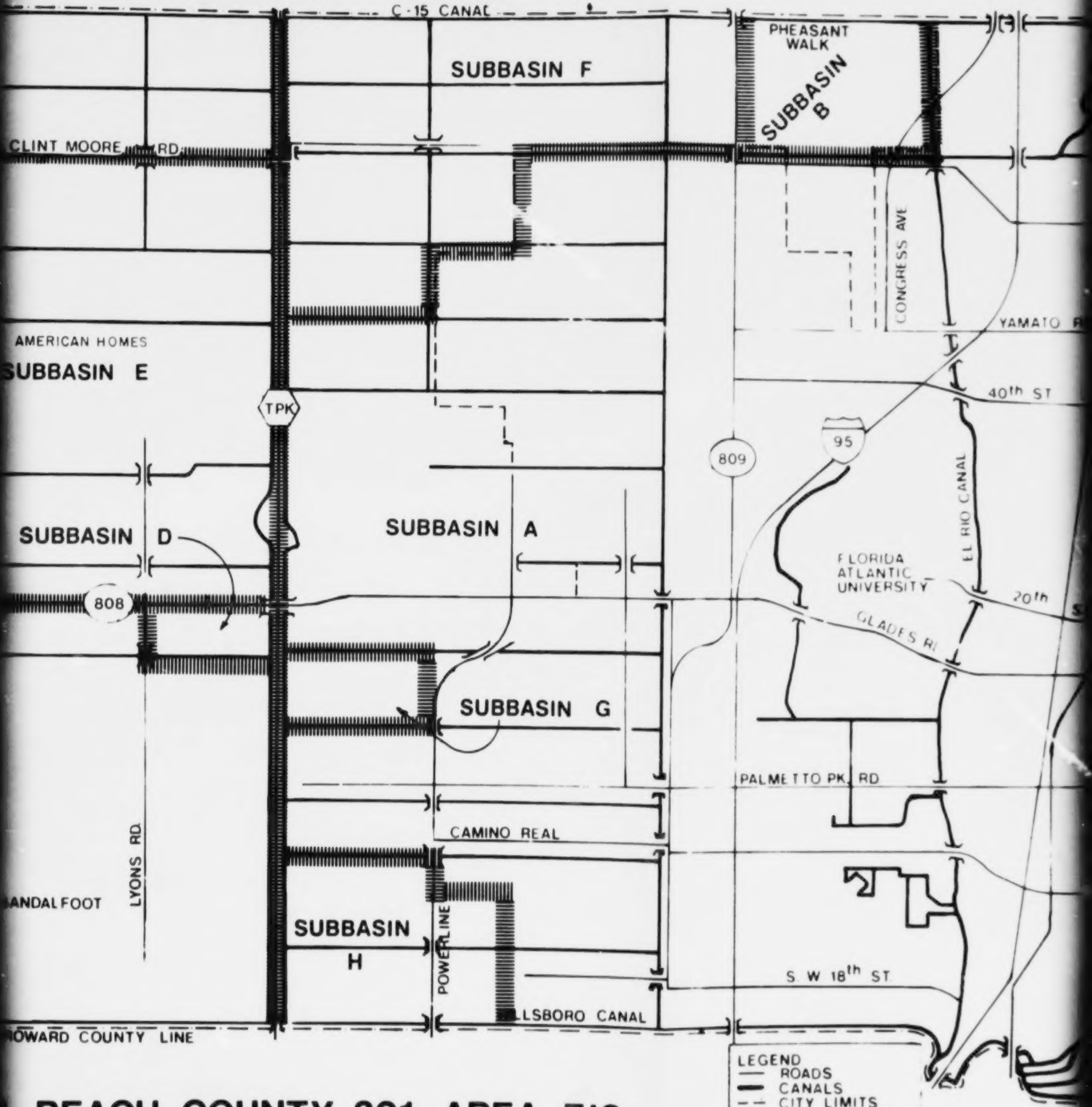
441
SUBBA
CONSERVATION AREA 1 LEVEE
SUBBASIN C
SANDALFOO
BROWARD C

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM BE

SUBBASIN BOUNDARIES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CITY LIMITS
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BEACH COUNTY 201 AREA EIS

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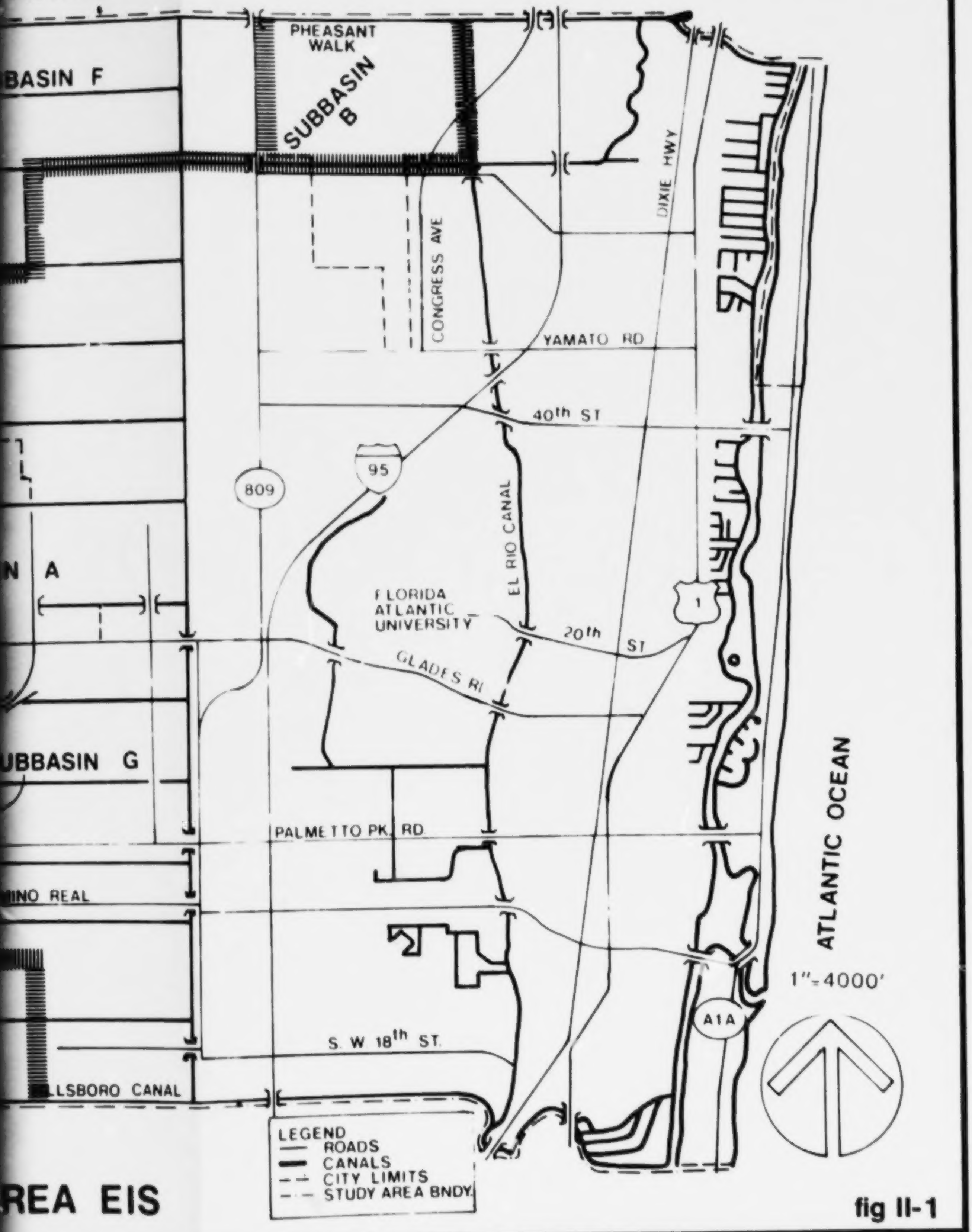
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S. W. 18th ST.
LLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

REA EIS

fig II-1

Part B: Identification and Development of Wastewater Service Configurations

The Planning Area was divided into three service areas consisting of the Boca Raton service area, the Palm Beach County service area west of Boca Raton, and the Pheasant Walk service area which is also operated by Palm Beach County.

Large portions of the Boca Raton service area (subbasin A) are currently served by wastewater collection and treatment facilities. The Glades Road Plant has a current capacity of 10 MGD and provides secondary treatment with discharge by ocean outfall. Because of the extent of the existing collection and treatment facilities, no other service configurations were developed for the Boca Raton service area.

Portions of the Palm Beach County service area west of Boca Raton (subbasins C, D, E, F, G, H, and I) are currently serviced by a collection system and two small treatment plants providing secondary treatment with discharge to percolation ponds. Treatment configurations developed for this area include continued use of the existing facilities, construction of pumping stations at the existing plant sites with construction of a force main to the Glades Road Plant for treatment and construction of two new plants in the area.

The Pheasant Walk service area (subbasin B) is currently served by a small treatment plant providing secondary treatment with discharge to percolation ponds. Treatment configurations considered for this service area include continued use of the existing facilities and pumping to the Glades Road facility for treatment.

Part C: Identification of Applicable Treatment and Disposal Methods

Treatment and Discharge to Surface Waters

Wastewater treatment and discharge to surface waters is the most commonly used wastewater management technique. It consists of treating wastewater by a combination of physical, chemical and/or biological processes and discharging the effluent to surface waters via an ocean outfall.

The City's Glades Road Plant discharges secondary treated effluent to the Atlantic Ocean. EPA has identified no significant problems resulting from the operation of this outfall or any of the other ocean outfalls in southeast Florida. No other surface waters in the area were considered to be viable as surface water discharge alternatives.

Treatment and Discharge By Land Application

Land application of treated wastewater provides for further removal or reduction of pollutants by physical and/or biological processes which occur in the soils. The successful operation of a land application system is dependent upon the characteristics such as soil structure and chemistry, topography, geology, hydrology, climate and vegetation. The land-treated wastewater is removed from the soil by evapotranspiration and is returned to surface streams by runoff or percolates downward through the soil to the groundwater.

Land treatment of wastewater is a broad term that can be broken down into three prinicipal processes. These processes are as follows:

- Slow Rate
- Rapid Infiltration
- Overland Flow

Comparison of design features and site characteristics for each of the processes are tabulated in Table II-1. The major difference between slow rate and rapid infiltration processes is principally in the rate of application. Rapid infiltration application rates are in the order of ten to thirty times the application rate of a slow rate system.

TABLE II - 1

COMPARISON OF DESIGN FEATURES FOR LAND TREATMENT PROCESSES

FEATURE	PRINCIPAL PROCESSES SLOW RATE	 RAPID INFILTRATION	 OVERLAND FLOW
Application techniques	Sprinkler or surface[a]	Usually surface	Sprinkler or surface
Annual application rate, ft.	2 to 20	20 to 560	10 to 70
Field area required, acres[b]	56 to 560	2 to 56	16 to 110
Typical weekly application rate, inches	0.5 to 4	4 to 120	2.5 to 6[c] 6 to 16[d]
Minimum preapplication treatment provided in United States	Primary sedimentation[e]	Primary sedimentation	Screening and grit removal
Disposition of applied wastewater	Evapotranspiration and percolation	Mainly percolation	Surface runoff and evapotranspiration with some percolation
Need for vegetation	Required	Optional	Required

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[a] Includes ridge-and-furrow and border strip.

[b] Field area in acres not including buffer area, roads, or ditches for 1 Mgal/d (43.8 L/s) flow.

[c] Range for application of screened wastewater.

[d] Range for application of lagoon and secondary effluent.

[e] Depends on the use of the effluent and the type of crop.

1 inch = 2.54 cm
1 foot = 0.305 m
1 acre = 0.405 ha

SOURCE: EPA Process Design Manual for Land Treatment of Municipal Effluent

Overland flow application rates are about one to three times the application rate of a slow rate system. A conventional overland flow system uses mildly sloping land and vegetation as its prinicipal tools. Treatment is rendered by the vegetation as wastewater flows "over the land". A minor portion of the wastewater is lost to percolation into the soil and evapotranspiration, however, most of the flow is usually collected and then disposed of by appropriate methods. Slow rate and rapid infiltration systems, on the other hand, rely on percolation through the soil for treatment. Percolating water may augment the groundwater supply or meet the consumptive demands of crops being grown.

Slow rate infiltration is generally accomplished by the spray irrigation of effluent. This technique applies treated wastewater to a vegetated area where a portion of the water is treated as it percolates slowly through the soil to the groundwater table, while the remainder of the water is removed by evapotranspiration. Soil conditions within the Planning Area generally appear to be adequate to warrant investigating the possibility of using spray irrigation slow rate land application systems to meet wastewater treatment needs of the Planning Area.

Percolation ponds are a means of land application of wastewater which is used in this Planning Area. When this technique is used, treated wastewater is disposed of into a large unlined pond and gradually percolates into the surrounding groundwater. Little or no treatment is accomplished in the soils utilizing this method of disposal.

On-site and community systems are also alternatives which discharge by land application. These systems include:

- Septic Tank/Soil Absorption Systems
- Aerobic Treatment/Absorption Bed
- Septic Tank/Mound System
- Septic Tank/Evapotranspiration System
- Pressure Sewers
- Vacuum Sewers
- Small Diameter Gravity Sewers

All individual, and on-site systems have been identified as Alternative Technology by current Federal guidelines. Under the Individual Systems Regulation (CFR 35.918-1, 35.918-2, 35.918-3) individual and on-site systems are eligible for a 4 percent set aside of state funding allocations by EPA. In addition, on-site systems are eligible for 85 percent funding because they are identified as alternative technology.

The use of on-site or community systems is most commonly seen in smaller communities or lower density areas in larger communities. This results because the cost to the individual homeowner is generally less for on-site systems in less densely populated areas. However, costs are not the only constraints used to define the feasibility of community and on-site systems. Constraints used to assess the feasibility of community and on-site systems are:

- Siting restrictions in terms of terrain
- Total System Cost
- System performance including removability and reliability

Deep Well Injection

Another possible means of wastewater disposal is deep well injection. Deep wells require no discharge to surface waters and are a potential means of water reuse in the future. The main problem with deep well injection is that until a well is actually drilled and tested it is unknown if a suitable injection zone exists; thus making the technique very costly.

Part D: Identification of Applicable Methods of Disinfection

Chlorine

Chlorine is a common disinfecting agent that has widespread use in water and wastewater treatment. However, recently there has been a resurgence of concern about the toxic potential of certain by-products of chlorination. These by-products are formed when trace organics combine with chlorine. The most widely publicized compounds of public health concerns are the trihalomethanes. As a result of this knowledge, alternative disinfectants have been evaluated.

Chlorine is reported to be an effective bacteriacide under most conditions. When chlorine is dissolved in water it can undergo various transformations. It first disassociates into acid forms, known as hypochlorous and hydrochloric. The hypochlorous form is considered to be the most effective disinfectant. Other forms which are not as efficient in disinfecting are hypochlorite and chloramines. Chloramines are compounds of chlorine and ammonia present in solution.

Research has shown that with the exception of one species of virus, it takes 3-10 times more chlorine to kill viruses than common pathogenic bacteria. In general, the inactivation rate of viruses by chlorine increases with time of exposure, lower pH (6.0 or less), and increase in temperature.

Of further concern is the recent knowledge that chlorine by-products and naturally occuring organic acids combine to form detrimental by-products. The first concrete evidence of these by-products, called trihalomethanes, surfaced in New Orleans in 1974. It was concluded in subsequent studies that trihalomethane formation was a direct result of chlorination of waters. Trihalomethane formation is occasionally of concern where prechlorination of wastewater brings chlorine compounds into contact with high concentrations of organic materials. Post chlorination of effluent is not considered to be a significant problem except in cases of direct recycling of wastewater as a drinking water supply with little or no dilution.

Costs for utilizing chlorine vary based on geographical area and many other factors. In general, however, chlorine is more economical if purchased in large quantities. For example, the approximate cost of chlorine varies from 11 cents per pound to 5 cents per pound for ton cylinder systems and tank car systems, respectively. These cost estimates are based on January 1976 cost figures.

Ozone

Ozone is another compound that can act as a disinfecting agent in water and wastewater although its use for disinfecting purposes has not been as common in the United States. Europe and Canada have had much more experience with ozone disinfection. According to the 201 Plan, there are almost 1,000 installations in Europe using ozone for disinfection of water.

Ozone is a very unstable compound and it is therefore very difficult to store. As a result, it becomes necessary to produce it on-site. Since its first use at the turn of the century, ozone generation has become reliable and much more economical.

Ozone is a very powerful disinfectant and strong oxidizing agent and there is no doubt of its superiority over chlorine as a viricide, even when employed against resistent strains. Besides being a very good viricide, ozone can oxidize organic compounds and reduce color and odor. Reportedly, ozone has been found to oxidize phenol and remove nitrate.

Advantages of using ozone are its effective viricidal and bacteriocidal quality, its ability to oxidize organic compounds, and its residual-free decomposition. Unlike chlorine, ozone decomposes rapidly but leaves no residuals except dissolved oxygen.

The disadvantages of using ozone are also reported in the literature. One disadvantage is the inability to rapidly check its effectiveness. Unlike chlorine, analytical methods for ozone are not specific or sensitive enough to control the feeding of this chemical with a relatively high degree of accuracy.

Another disadvantage of using ozone is the difficulty encountered when trying to compensate ozone feed rates to the variations in ozone demand. Also, solubility of ozone decreases when temperature and humidity are high because of the inherent characteristics of the production process. Because of its very unstable nature, ozone does not provide residual disinfecting action when utilized as a water or wastewater disinfectant. It is reported that the half-life of ozone under general conditions is about 20 minutes. Therefore, no lasting residual disinfecting action can be expected when using ozone.

Capital and operating costs for ozone, as well as electrical energy requirements for on-site production are somewhat higher than for using chlorine and thus make chlorine more cost effective under most conditions. As an example, the total energy requirements for chlorination is about 30 kilowatt hours per million gallons. On the other hand, the total energy requirements for ozone production is about 550 kilowatt hours per million gallons.

Iodine

Iodine is an alternative disinfectant to the commonly employed chlorine and ozone. Iodine is less reactive with organic compounds so it is considered more stable in low residual concentrations. The advantage of this characteristic is that the products of organics with other disinfectants produce odors, whereas iodine does not. There are reports of iodine imparted taste in concentrations as low as 1.5 to 2.0 mg/l, but it is reported as unobjectionable.

Iodine's bacteriocidal action has been found somewhat inferior to chlorine under controlled conditions. However, with respect to higher organisms such as cysts and spores, iodine exhibited very good disinfecting power. Quick destruction of cysts and spores has been reported in waters with iodine concentrations of 5-10 mg/l.

When compared to chlorine, the baseline of disinfectants in the field, iodine has one marked advantage. Namely, its failure to react with nitrogen compounds such as ammonia, does not rob it of its effectiveness as a viricide or bacteriacide. However, it is unlikely that it could substitute for chlorine because of its higher cost and restricted availability.

Bromine

Bromine is another halogen that is considered a disinfectant in water. It exhibits chemical characteristics like that of chlorine. For example, it hydrolizes to acid forms and reacts with ammonia to form bromamines. Its bacteriacidal capability has been found similar to chlorine. Unlike chloramines, however, bromamines do not create toxic conditions in fish laden waters.

In spite of these advantages, it is unlikely that bromine can substitute for chlorine as a disinfectant in treatment facilities because of its greater cost and its lesser availability. In addition, there have been no large scale projects implemented to test the use of bromine.

Part E: Non-Structural Wastewater Management Systems

Flow and Waste Reduction

The use of water conservation and flow reduction techniques is an important non-structural technique. Where a treatment plant is already overloaded, a reduction in wastewater flows could significantly improve wastewater treatment.

The reduction of flows could have several effects upon a community's wastewater system. First, treatment could be improved with reduced flows. Secondly, the community could possibly avoid the cost of constructing a new or expanded treatment plant with the reduction of flows into the existing plant or prolong the design life of plants presently being designed or constructed.

Domestic sewage production may be decreased by certain techniques for reducing water consumption which evolved over the past several decades. Increasing water costs may be expected to induce such conservation of water by residential users; however, most of the reduction in consumption will be limited to residential uses such as lawn watering and car washing, which will not affect the overall sewage flows.

Concern about adequate water supply and water conservation has led to the development of numerous devices for reducing residential water usage. Included are such items as toilets which require considerably less water for flushing and shower hands which need less flow to produce the same washing and rinsing effects.

Reduced wastewater production by water conservation should continue to be encouraged. Reduction of the volume of wastewater, however, will have little effect on the quantity of waste constituents.

Land Use and Development Controls

Land use controls which provide for planned development may limit potential adverse impacts on water quality (and other environmental amenities) from uncontrolled growth. Limiting the density of development or preventing development within unique agricultural lands are specific applications of this type of control.

In order to effectively plan and manage land use there are a variety of land management tools and techniques that are available to the local governments in the Planning Area. These techniques include:

- Comprehensive plans.
- Zoning ordinances.
- Subdivision and land development regulations.
- Easements.
- Fee simple acquisition of land.
- Staged growth policies.
- Conservation zoning district.
- Model zoning ordinance.
- Transfer of development rights.

Land use control mechanisms may be of limited use in the Palm Beach County portion of the Planning Area since extensive development approvals have already been given at the local level.

Part F: Development of Alternatives

Initial alternatives were developed by combining wastewater service configurations and treatment and disposal techniques as discussed earlier in this chapter. This section presents a description of each of these alternatives. A more detailed analysis can be found in the South Palm Beach County Facility Plan, Third Interim Submittal.

Proposed systems for sludge treatment and disposal are not addressed at this time. The evaluation of alternatives for sludge management is still underway and will be in the Final EIS.

Alternative 1:

Alternative 1 consists of one regional facility with year 2000 capacity of 29 MGD located at the existing site of the Glades Road Plant to provide service for the entire Planning Area. This would require an increase of 19 MGD over the current capacity of 10 MGD. An activated sludge process, providing a secondary level of treatment followed by chlorination, would be used.

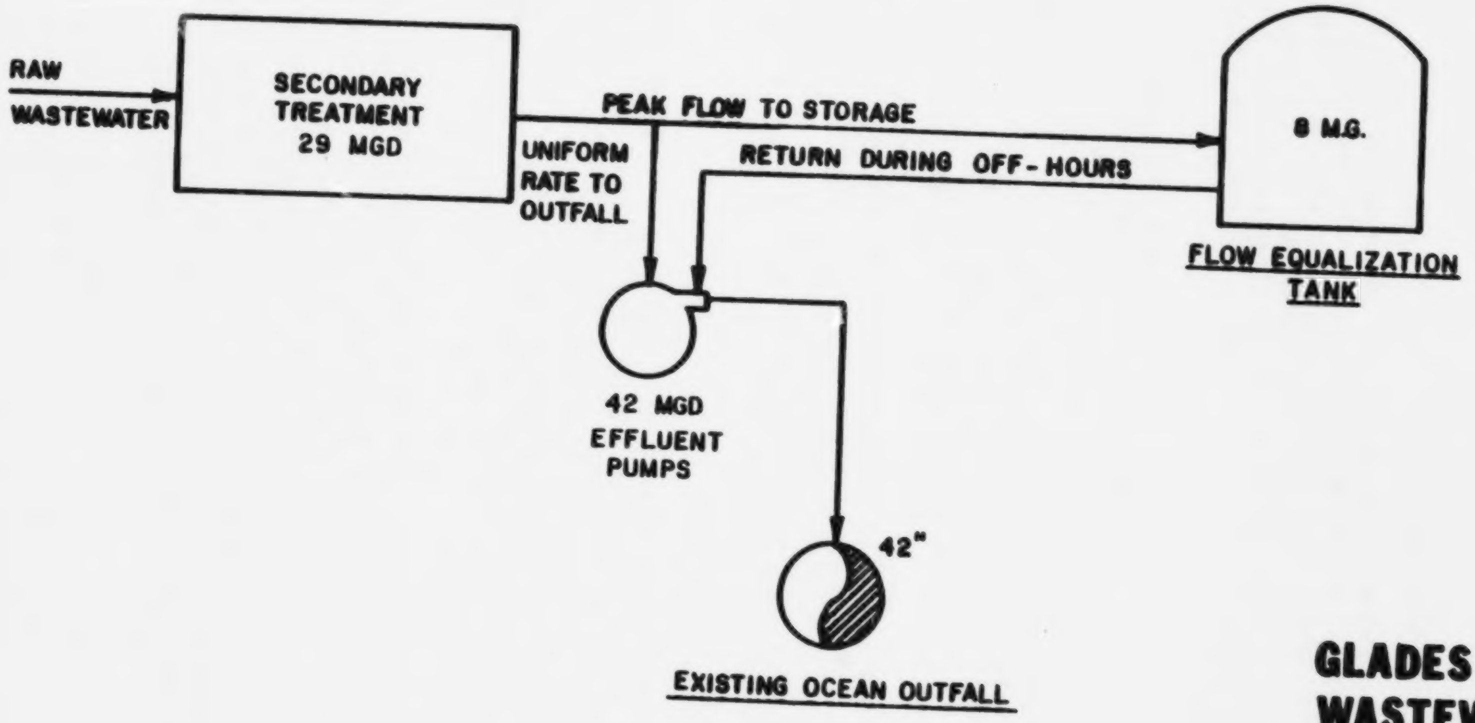
Effluent disposal would occur through the existing ocean outfall. To effectively use the outfall, flow equalization is proposed for this alternative. The estimated volume of equalization storage needed is 8 million gallons. However, two tanks would be used with equal or nearly equal volume. This volume would be utilized to store peak flows beyond the plant's planned treatment capacity of 29 MGD. Projected peak flows for the year 2000 are approximmately 56 MGD. A schematic for Alternative 1 is presented in Figure II-2.

Three regional pump stations would be needed to pump wastewater to the Glades Road facility. One regional pumping station would be located at the Sandalfoot Cove Wastewater Plant, one at the American Homes Plant and one at the Pheasant Walk Plant as shown in Figure II-3.

Alternative 2:

Alternative 2 consists of one regional treatment facility at the site of the Glades Road Plant. This plant would provide service for the entire Planning Area. Effluent disposal would be a combination of ocean outfall and spray irrigation. Based on the screening process performed as part of this study, spray irrigation would be limited to golf courses, parks, and open areas. The layout of the spray irrigation is as shown in Figure II-4.

Treatment at the Glades Road facility would consist of secondary treatment using activated sludge for that portion of the flow discharged to the ocean. For that portion of the flow used for spray irrigation, a treatment process consisting of secondary treatment plus coagulation-filtration-chlorination is proposed. The treatment capacity of the Glades Road Plant would be increased from 10 MGD to 29 MGD by the year 2000. An equalization volume of 8 million gallons would be used in this alternative to dampen peak flow rates. A schematic for Alternative 2 is presented in Figure II-5.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FLOW EQUALIZATION
TANK
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EFFLUENT
PUMPS
42"
EXISTING OCEAN OUTFALL

SCHEMATIC FOR ALTERNATIVE I

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WASTEWATER
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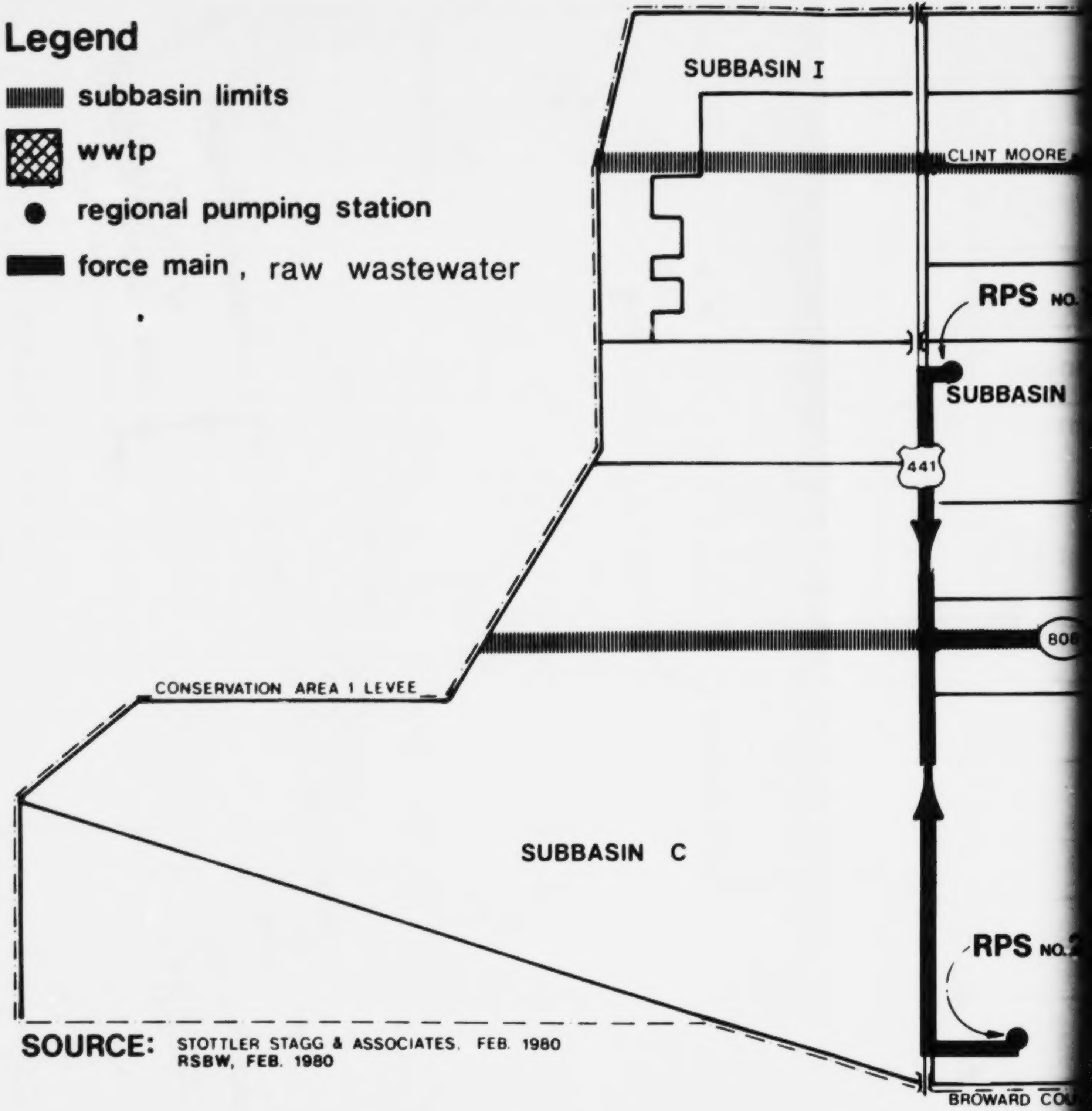
FIGURE II - 2

WASTEWATER TR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SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
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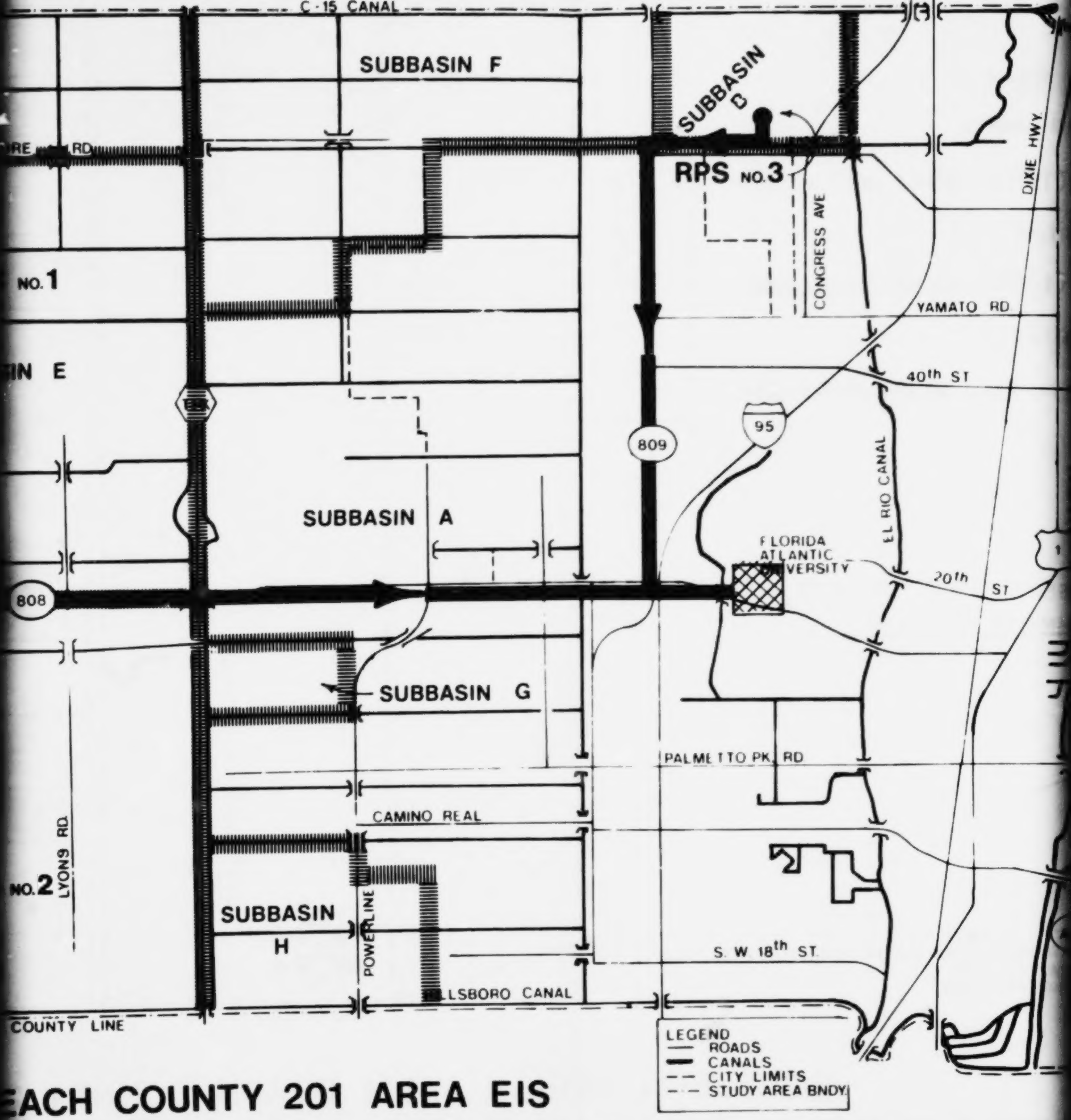
TREATMENT SYSTEM - ALTERNATIVE 1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EACH COUNTY 201 AREA EIS

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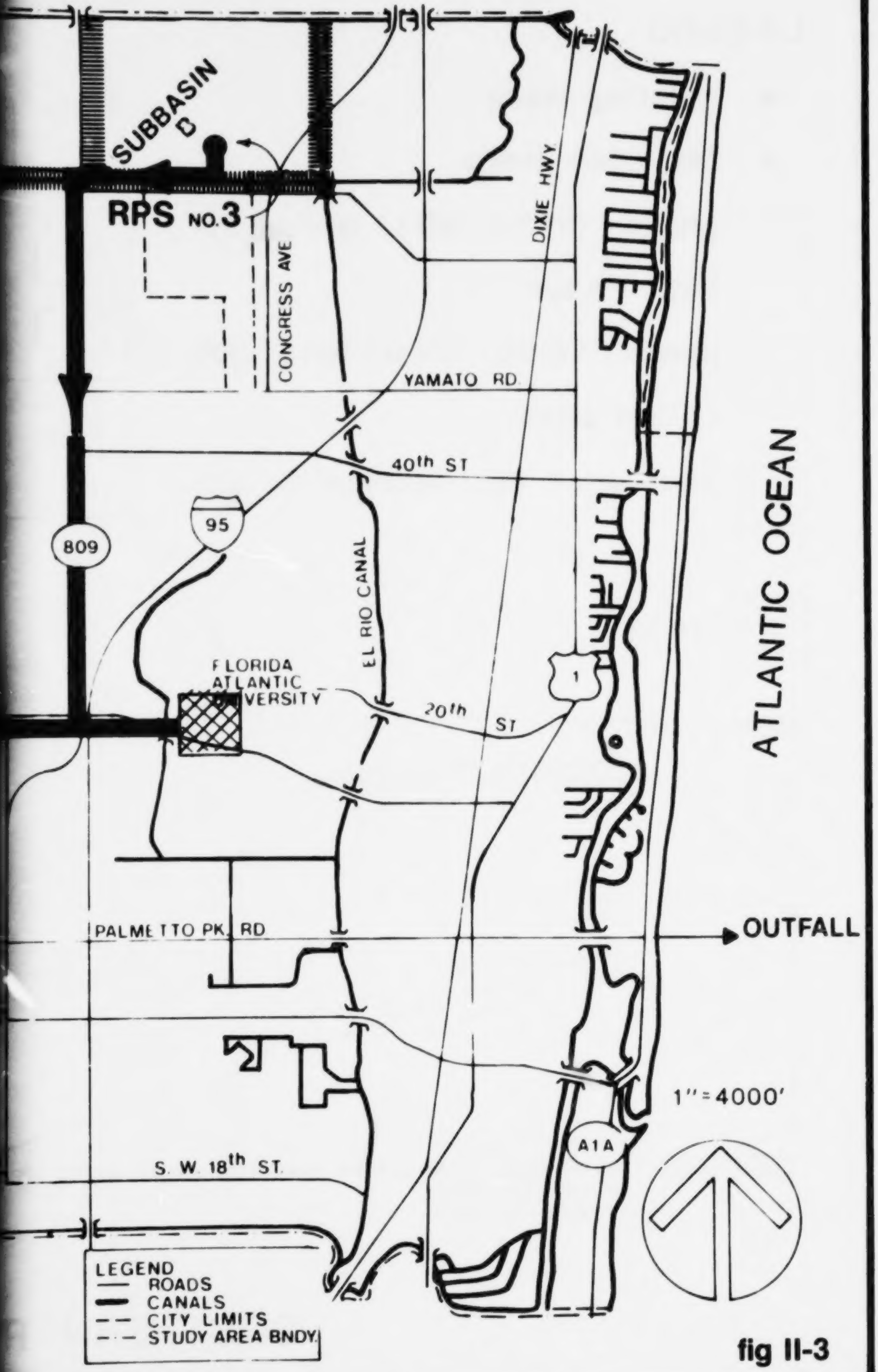
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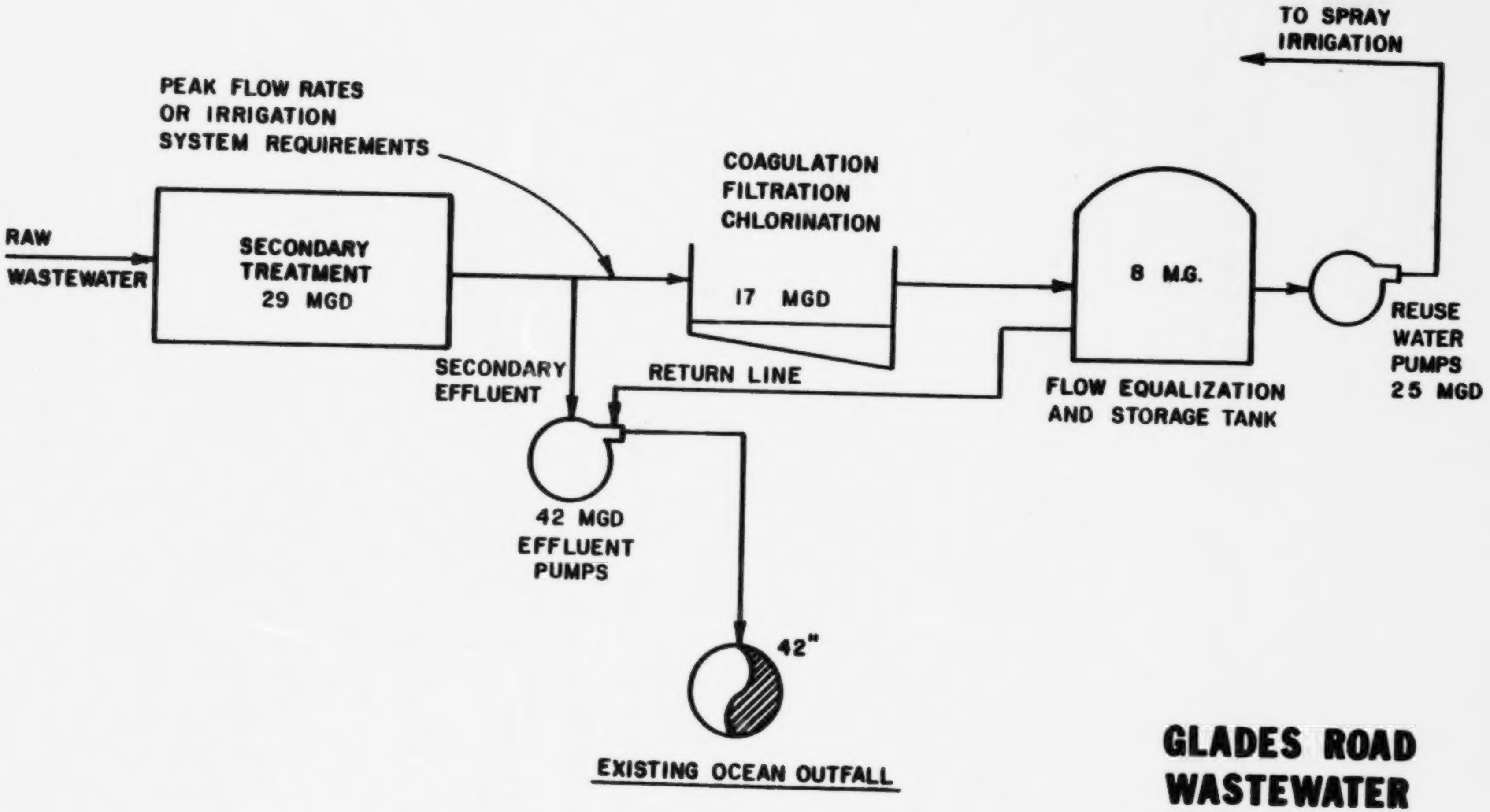
– – CITY LIMITS
– · – STUDY AREA BNDY.

fig II-3


TO SPRAY IRRIGATION
PEAK FLOW RATES OR IRRIGATION SYSTEM REQUIREMENTS
COAGULATION FILTRATION CHLORINATION
RAW WASTEWATER
SECONDARY TREATMENT 29 MGD
17 MGD
8 M.G.
REUSE WATER PUMPS 25 MGD
SECONDARY EFFLUENT
RETURN LINE
FLOW EQUALIZATION AND STORAGE TANK
42 MGD EFFLUENT PUMPS
42"
EXISTING OCEAN OUTFALL

SCHEMATIC FOR ALTERNATIVE 2

GLADES ROAD
WASTEWATER
TREATMENT
PLANT

FIGURE II - 5

Three regional pump stations would be utilized to pump wastewater to the Glades Road Plant. The location of the pump stations would be the same as those described in Alternative 1.

Alternative 3:

Alternative 3 consists of one regional facility located at the Glades Road Plant. This plant would provide service to the entire Planning Area except for subbasins F and I which would be served by on-site systems as shown Figure II-6. Treatment and disposal would be the same as for Alternative 1 with a decrease in capacity of 2 MGD.

Alternative 4:

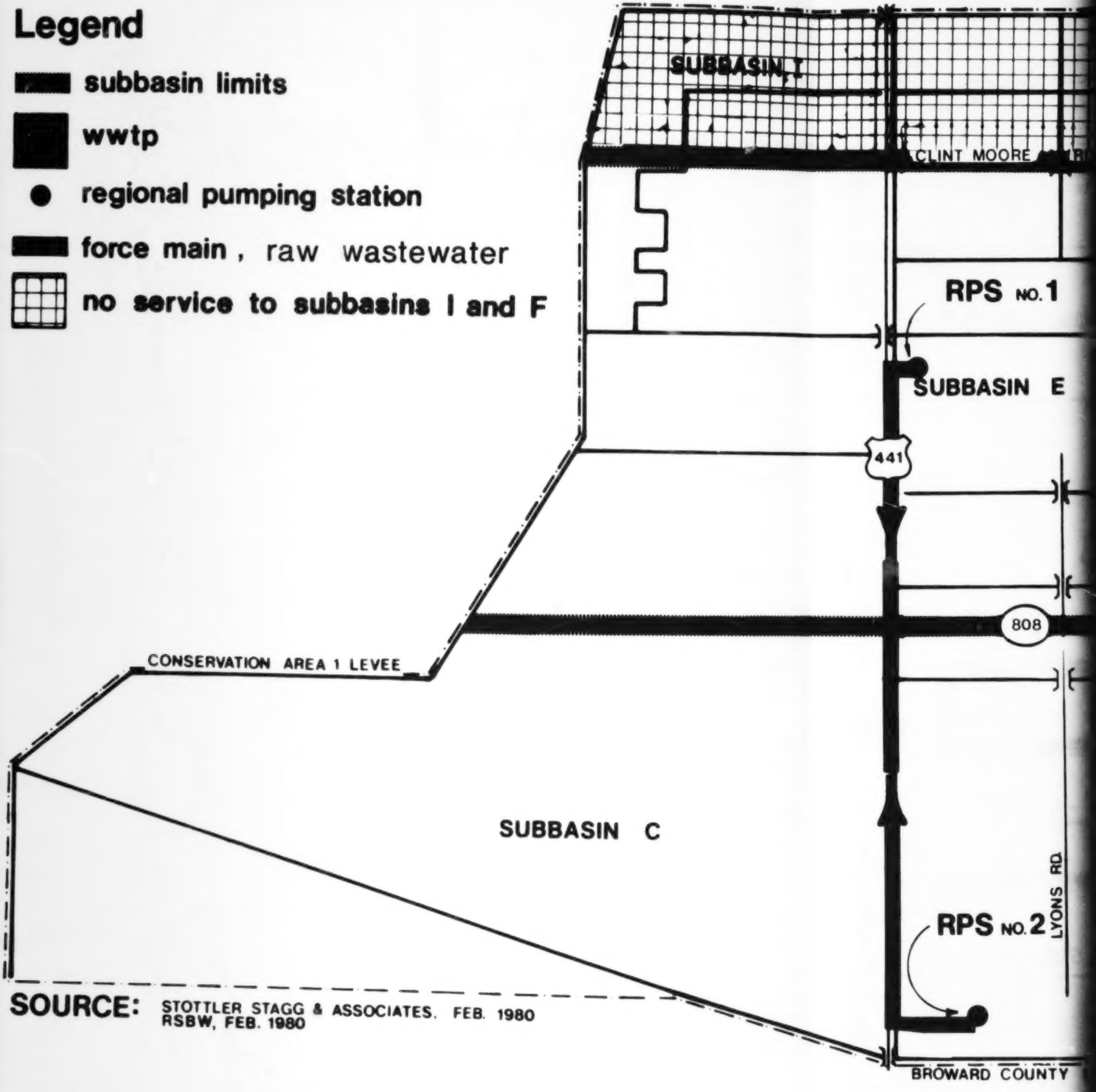
Alternative 4 consists of two regional plants. The Glades Road Plant capacity would be increased to 21 MGD from its existing 10 MGD. The treatment and the disposal technique used would be the same as for Alternative 1. This plant would serve subbasins A, B, and F as shown in Figure II-7.

A West Regional Plant would be constructed. This plant would employ activated sludge and chlorination and would be designed with a capacity of 9 MGD. Effluent disposal would consist of deep well injection. This plant would serve subbasins C, D, E, I, G, and H as shown in Figure II-7.

Alternative 5:

This alternative consists of two regional treatment facilities. One regional treatment facility would be the existing Glades Road Plant expanded to 21 MGD. An equalization volume of 6 million gallons would be needed to dampen peak flow rates from the Glades Road service area only. A schematic of this alternative is presented in Figure II-8.

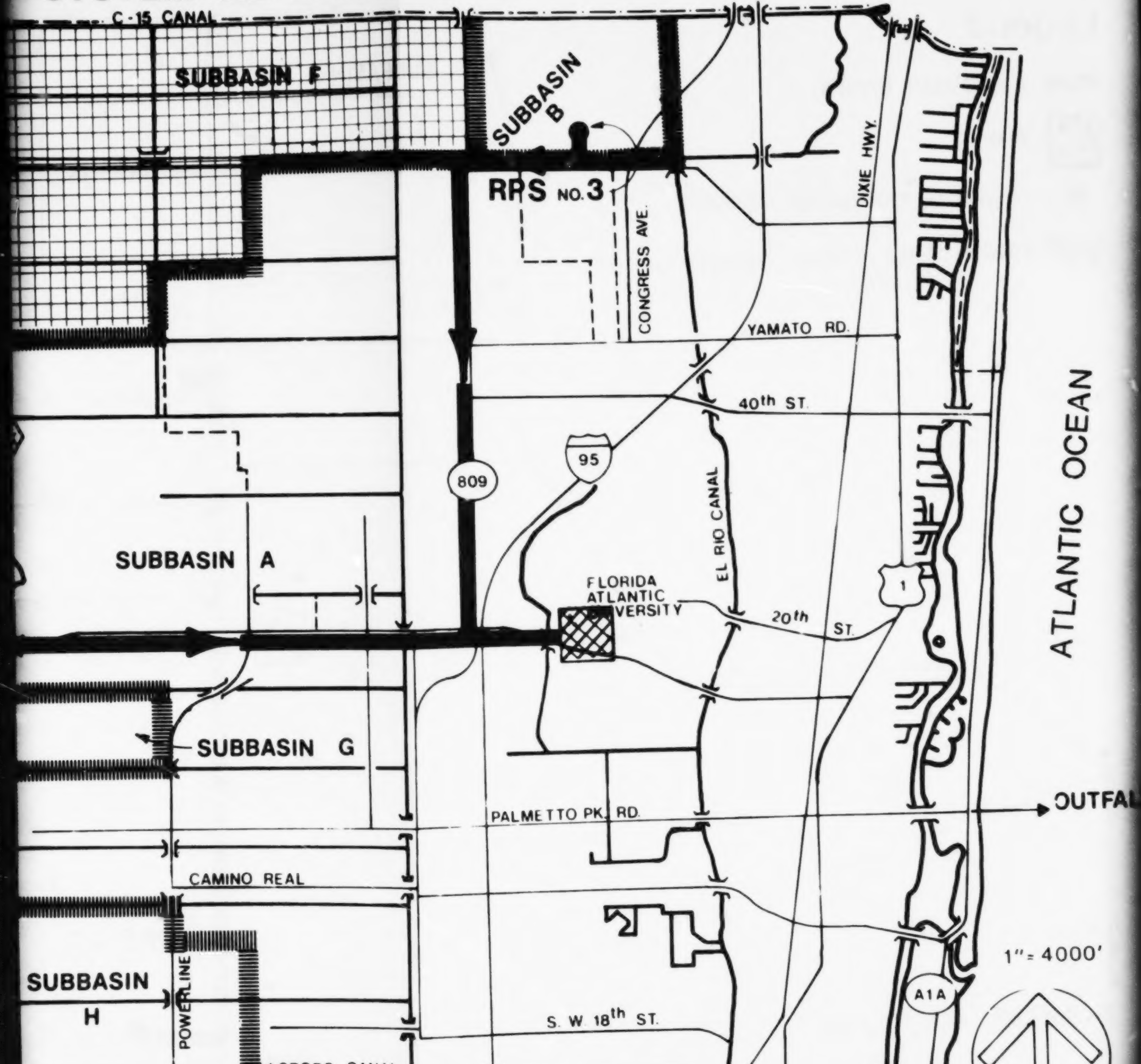
WASTEWATER TREA


Legend
▬ subbasin limits
■ wwtp
● regional pumping station
▬ force main , raw wastewater
▦ no service to subbasins I and F
SUBBASIN I
CLINT MOORE
RPS NO. 1
SUBBASIN E
441
808
CONSERVATION AREA 1 LEVEE
SUBBASIN C
LYONS RD.
RPS NO. 2
BROWARD COUNTY

SOURCE: STOTTLER STAGG & ASSOCIATES. FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM BEACH

SYSTEM - ALTERNATIVE 3

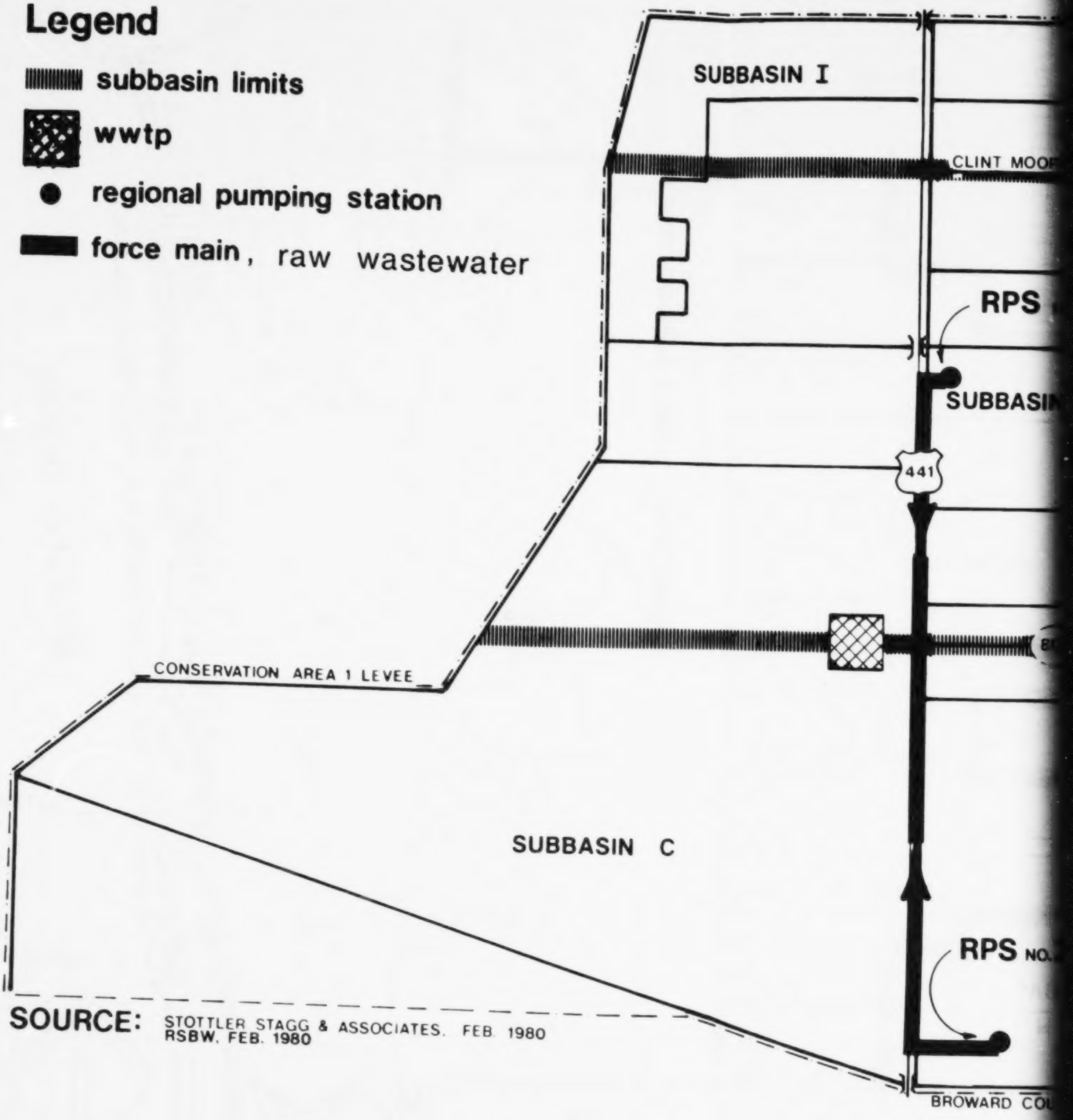


C-15 CANAL
SUBBASIN F
SUBBASIN B
RPS NO. 3
CONGRESS AVE.
DIXIE HWY.
YAMATO RD.
40th ST.
95
809
EL RIO CANAL
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
ATLANTIC OCEAN
SUBBASIN G
OUTFAL
PALMETTO PK. RD.
CAMINO REAL
SUBBASIN H
POWERLINE
1" = 4000'
A1A
S. W. 18th ST.
LLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

NTY 201 AREA EIS

fig II-

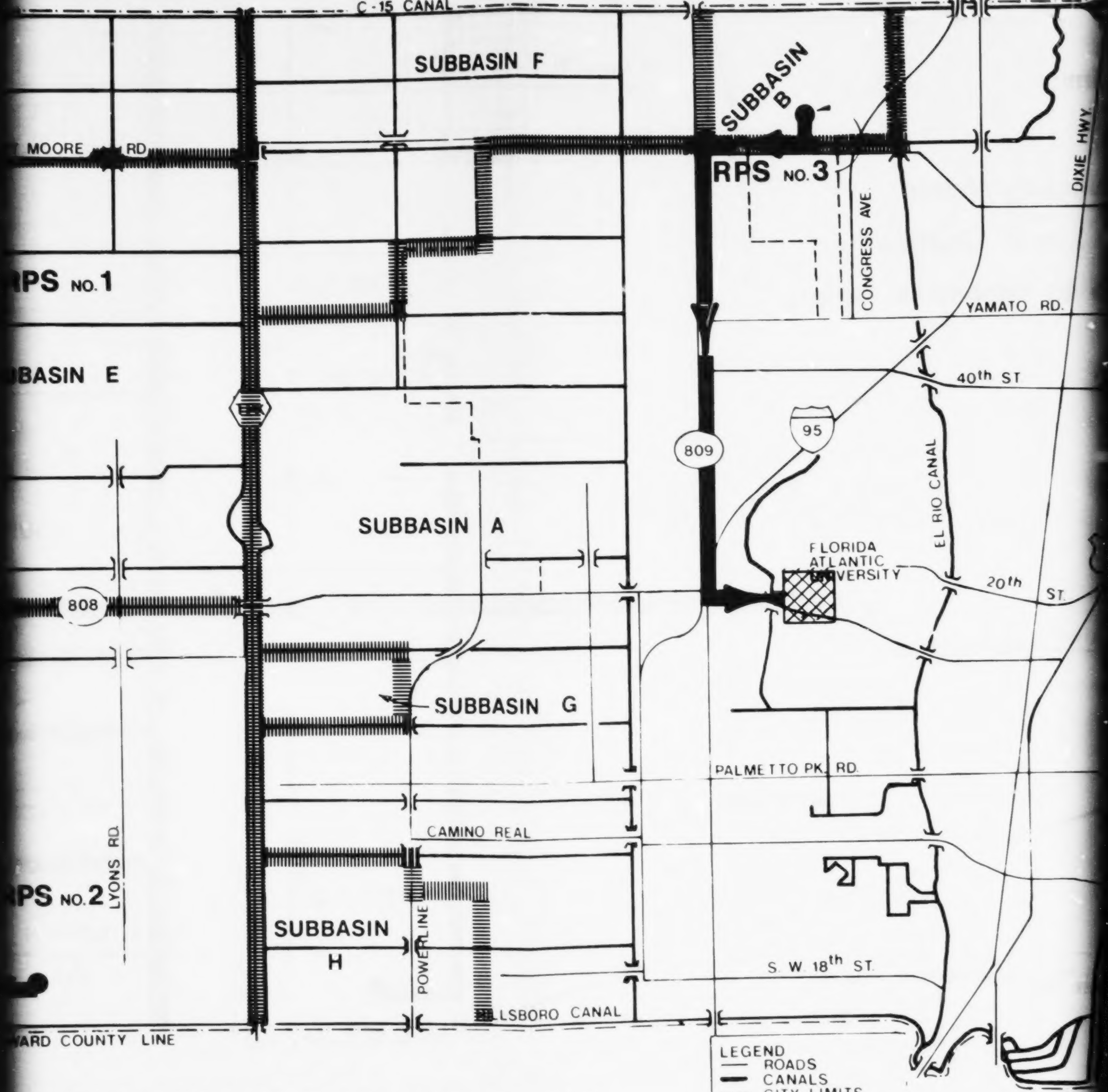
WASTEWATER T


Legend
▨ subbasin limits
▨ wwtp
● regional pumping station
▬ force main, raw wastewater
SUBBASIN I
CLINT MOOR
RPS
SUBBASIN
441
80
CONSERVATION AREA 1 LEVEE
SUBBASIN C
RPS NO.
BROWARD CO

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM BEA

R TREATMENT SYSTEM-ALTERNATIVE 4


C-15 CANAL
SUBBASIN F
SUBBASIN B
MOORE RD
RPS NO. 3
CONGRESS AVE.
DIXIE HWY.
RPS NO. 1
YAMATO RD.
BASIN E
40th ST
TPK
95
809
EL RIO CANAL
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
20th ST.
808
SUBBASIN G
PALMETTO PK. RD.
CAMINO REAL
RPS NO. 2
LYONS RD.
SUBBASIN H
POWERLINE
S. W. 18th ST.
HILLSBORO CANAL
WARD COUNTY LINE
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

BEACH COUNTY 201 AREA EIS

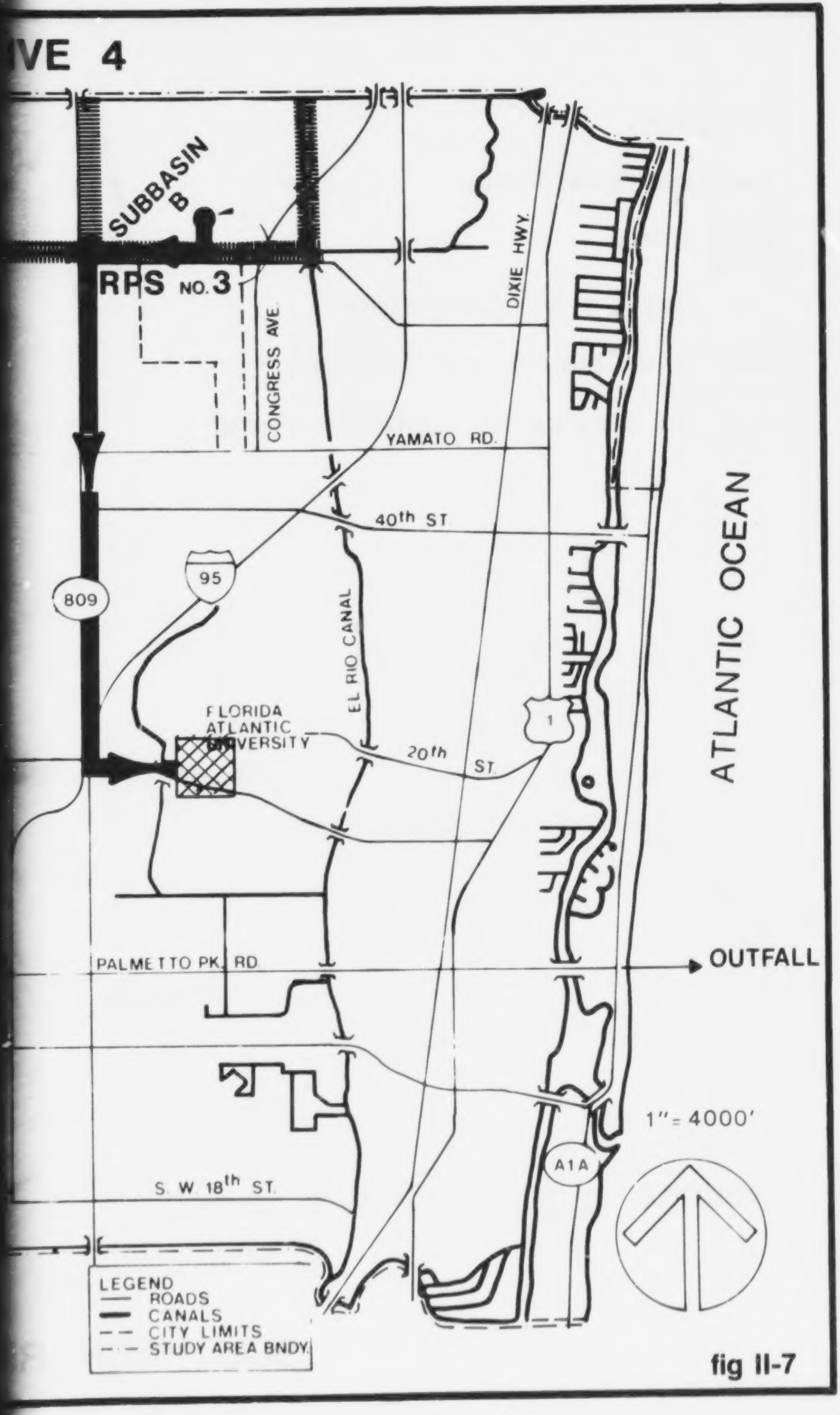
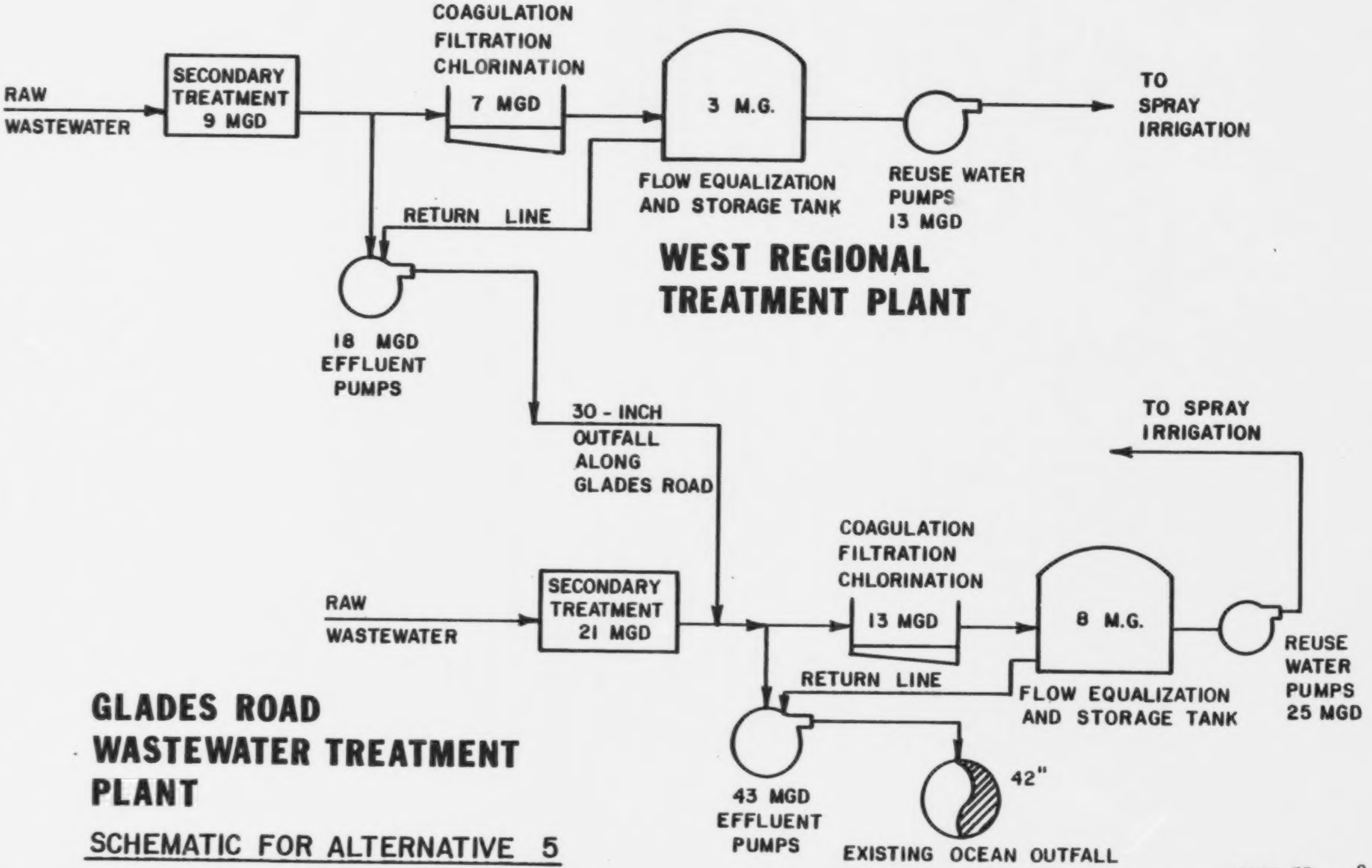

IVE 4
SUBBASIN B
RPS NO. 3
CONGRESS AVE.
DIXIE HWY.
YAMATO RD.
40th ST
95
809
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
ATLANTIC OCEAN
PALMETTO PK. RD.
OUTFALL
1" = 4000'
A1A
S. W. 18th ST.
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

fig II-7


COAGULATION
FILTRATION
CHLORINATION
RAW
WASTEWATER
SECONDARY
TREATMENT
9 MGD
7 MGD
3 M.G.
TO
SPRAY
IRRIGATION
FLOW EQUALIZATION
AND STORAGE TANK
REUSE WATER
PUMPS
13 MGD
RETURN LINE
WEST REGIONAL
TREATMENT PLANT
18 MGD
EFFLUENT
PUMPS
30 - INCH
OUTFALL
ALONG
GLADES ROAD
TO SPRAY
IRRIGATION
COAGULATION
FILTRATION
CHLORINATION
RAW
WASTEWATER
SECONDARY
TREATMENT
21 MGD
13 MGD
8 M.G.
RETURN LINE
FLOW EQUALIZATION
AND STORAGE TANK
REUSE
WATER
PUMPS
25 MGD
43 MGD
EFFLUENT
PUMPS
42"
EXISTING OCEAN OUTFALL

GLADES ROAD WASTEWATER TREATMENT PLANT

SCHEMATIC FOR ALTERNATIVE 5

FIGURE II - 8

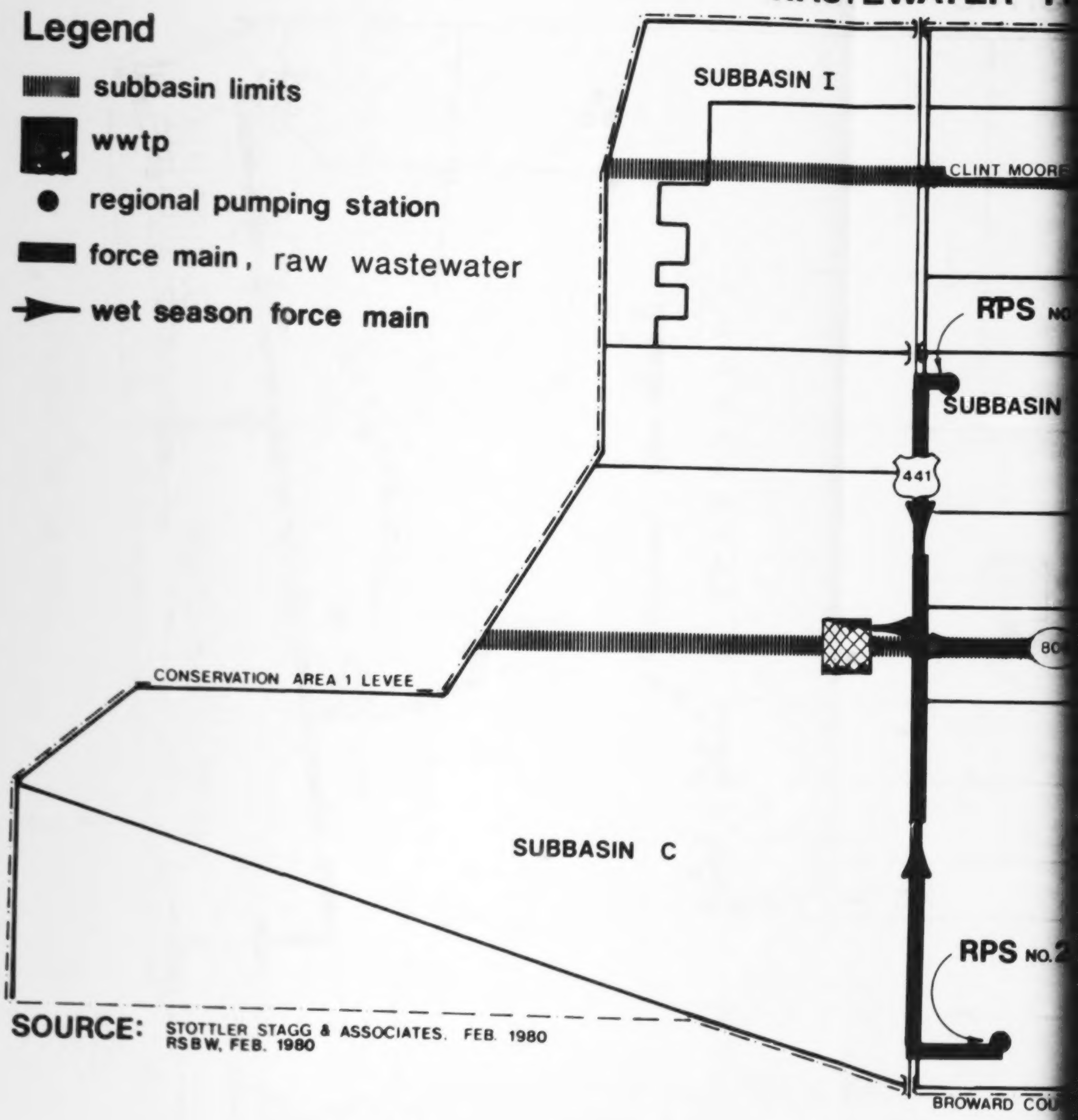
A West Regional Plant would be constructed. This plant would be planned to dispose of its effluent by spray irrigation. The Plant would be located just west of State Road 7 would employ secondary treatment using activated sludge and coagulation-filtration-chlorination of wastewater. The plant would be designed for a capacity of 9 MGD; suitable to meet year 2000 flow projections. This plant would be connected to the Glades Road Plant via a 30-inch outfall as shown on Figure II-9. This outfall would transport flow into the Glades Road Plant so it could be discharged through the existing ocean outfall. This outfall serves as a backup to the spray irrigation system proposed for the West Plant. Selected sites for spray irrigation and the proposed delivery system for this alternative are shown on Figure II-10.

Because additional flows need to be handled by the Glades Road effluent pumping system the equalization storage must be increased to 8 million gallons for this alternative. The proposed equalization tank serves a dual purpose. Located downstream of the coagulation-filtration-chlorination process, the equalization tank would serve as a buffer against peak flows and as a source of storage for irrigation water. Treated effluent stored in the equalization tank would have received the added treatment making it suitable for spray irrigation. However, there would be flexibility in the design of the equalization tank to allow discharge of stored wastewater through the outfall.

Alternative 6:

This alternative consists of three regional treatment facilities located at Glades Road, Sandalfoot Cove, and American Homes. Treatment capacity at Glades Road would increase from 10 to 17.5 MGD. Treatment capacity at Sandalfoot would increase from 3 to 6 MGD. American Homes capacity would increase from 1.5 to 6 MGD. Disposal of wastewater from all three treatment facilities would be by ocean outfall. A 30-inch diameter line would be required to convey treated effluent eastward. This alternative is depicted in Figure II-11.

WASTEWATER T

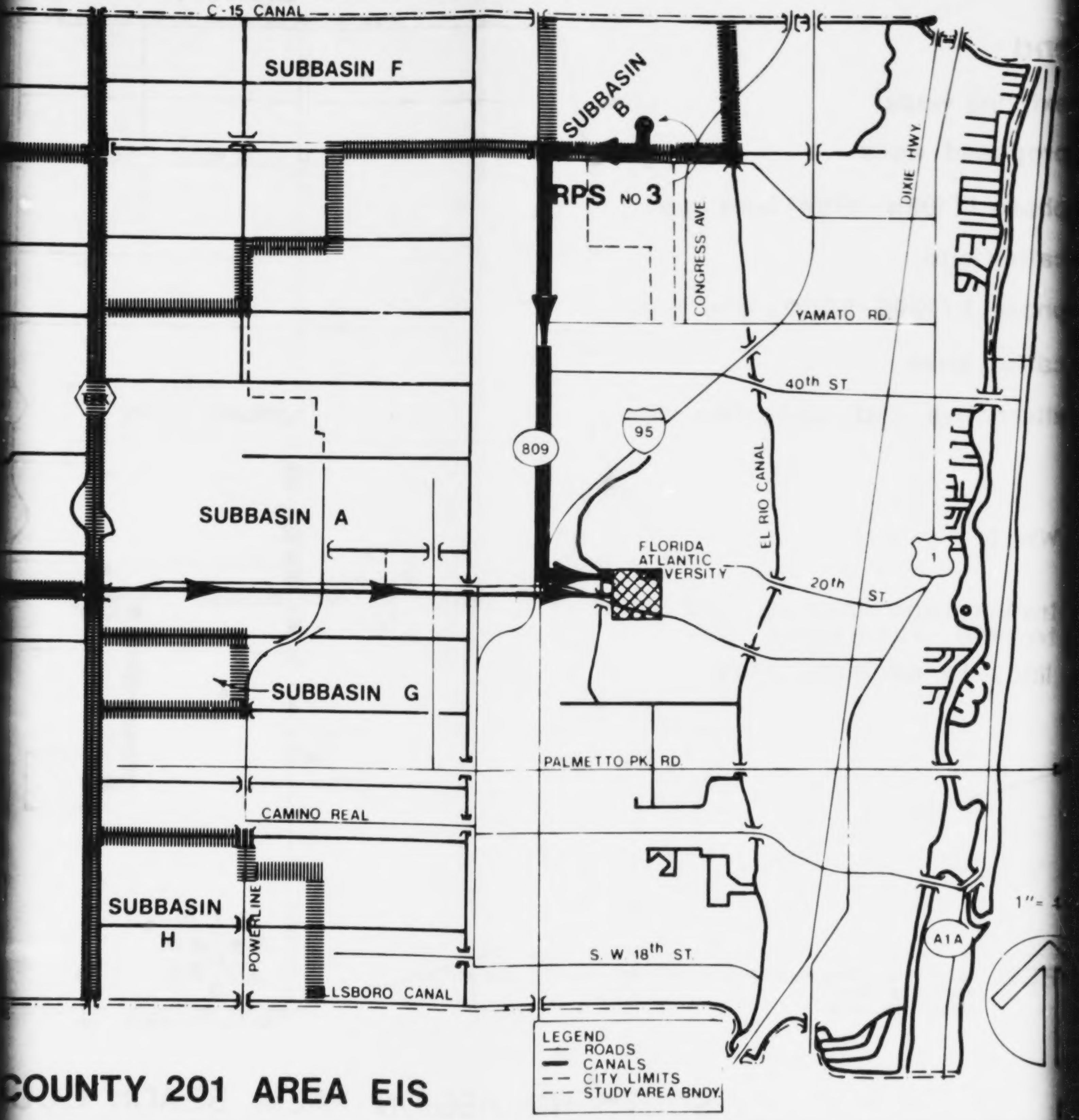


Legend
subbasin limits
wwtp
● regional pumping station
force main, raw wastewater
wet season force main
SUBBASIN I
CLINT MOORE
RPS NO
SUBBASIN
441
80
CONSERVATION AREA 1 LEVEE
SUBBASIN C
RPS NO.2
BROWARD COU

SOURCE: STOTTLER STAGG & ASSOCIATES. FEB. 1980
RSBW, FEB. 1980

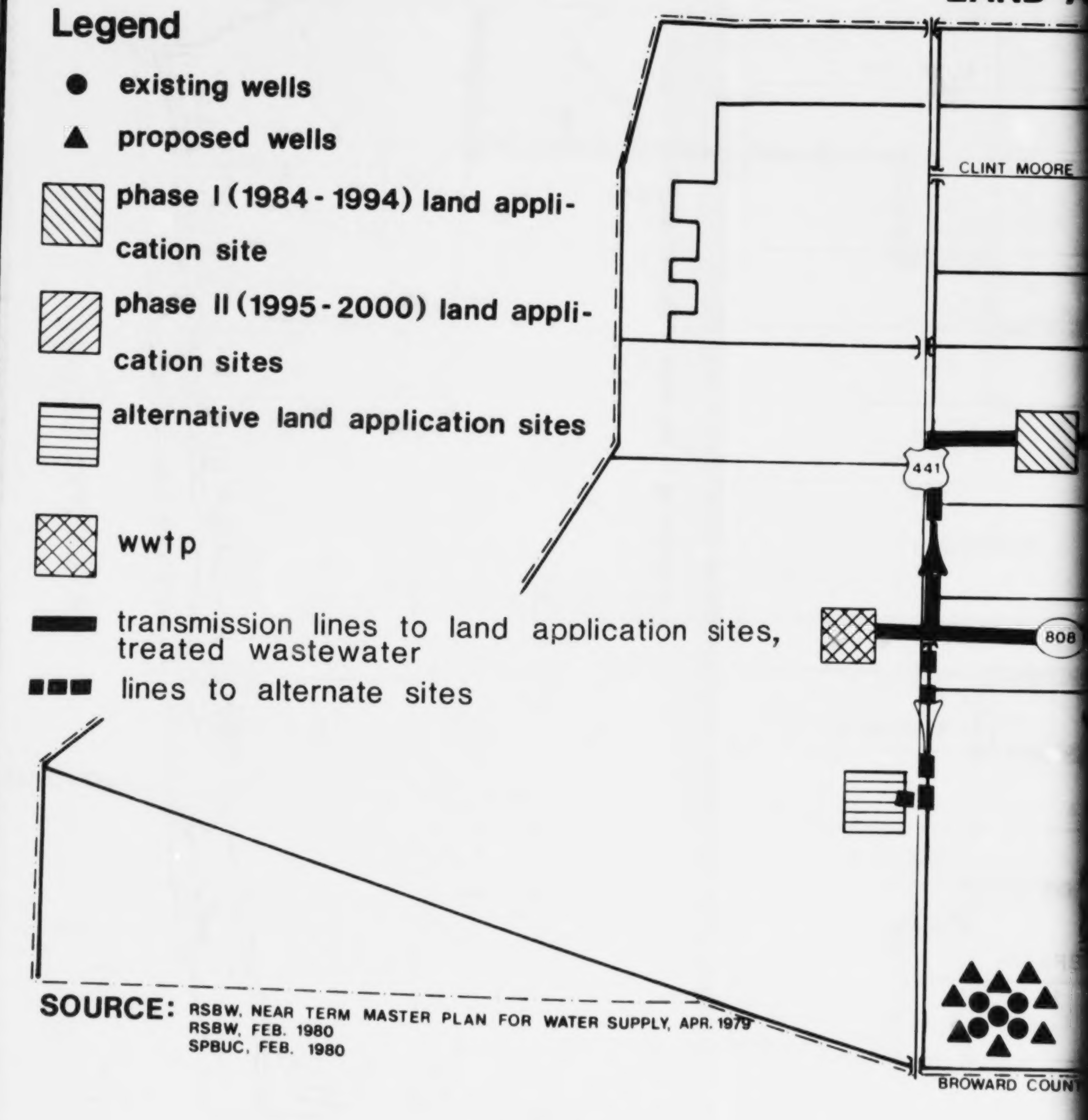
SOUTHERN REGION PALM BEA

TMENT SYSTEM-ALTERNATIVE 5


C-15 CANAL
SUBBASIN F
SUBBASIN B
RPS NO 3
CONGRESS AVE
DIXIE HWY
YAMATO RD.
40th ST
95
809
EL RIO CANAL
SUBBASIN A
FLORIDA ATLANTIC VERSITY
20th ST
1
SUBBASIN G
PALMETTO PK. RD
CAMINO REAL
SUBBASIN H
POWERLINE
S. W. 18th ST
LLSBORO CANAL
A1A
1"=
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

COUNTY 201 AREA EIS

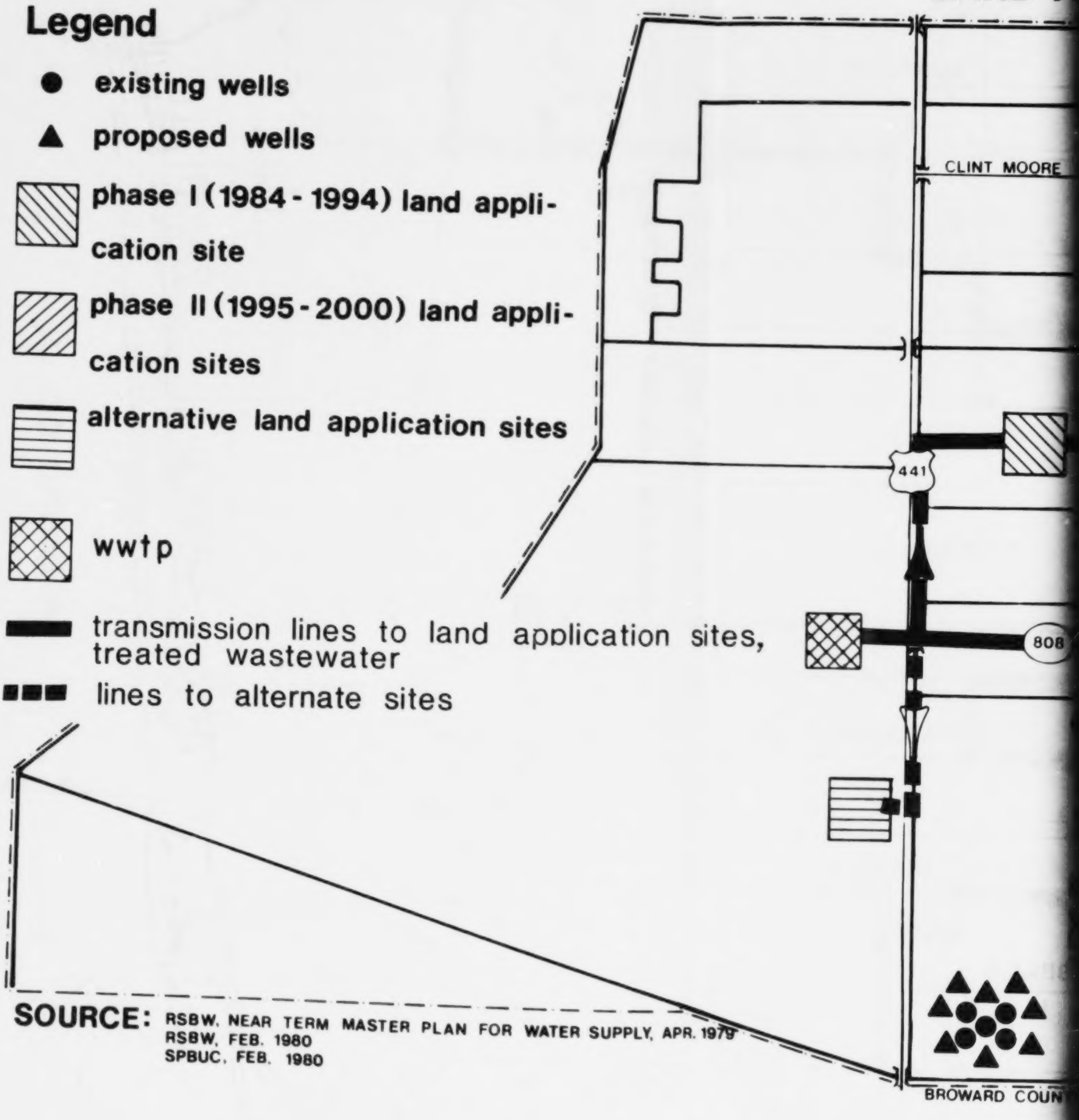
LAND A


Legend
● existing wells
▲ proposed wells
▧ phase I (1984 - 1994) land application site
▨ phase II (1995 - 2000) land application sites
▤ alternative land application sites
▦ wwtp
▬ transmission lines to land application sites, treated wastewater
■■■ lines to alternate sites
CLINT MOORE
441
808
BROWARD COUN

SOURCE: RSBW, NEAR TERM MASTER PLAN FOR WATER SUPPLY, APR. 1979
RSBW, FEB. 1980
SPBUC, FEB. 1980

SOUTHERN REGION PALM BEAC

LAND A

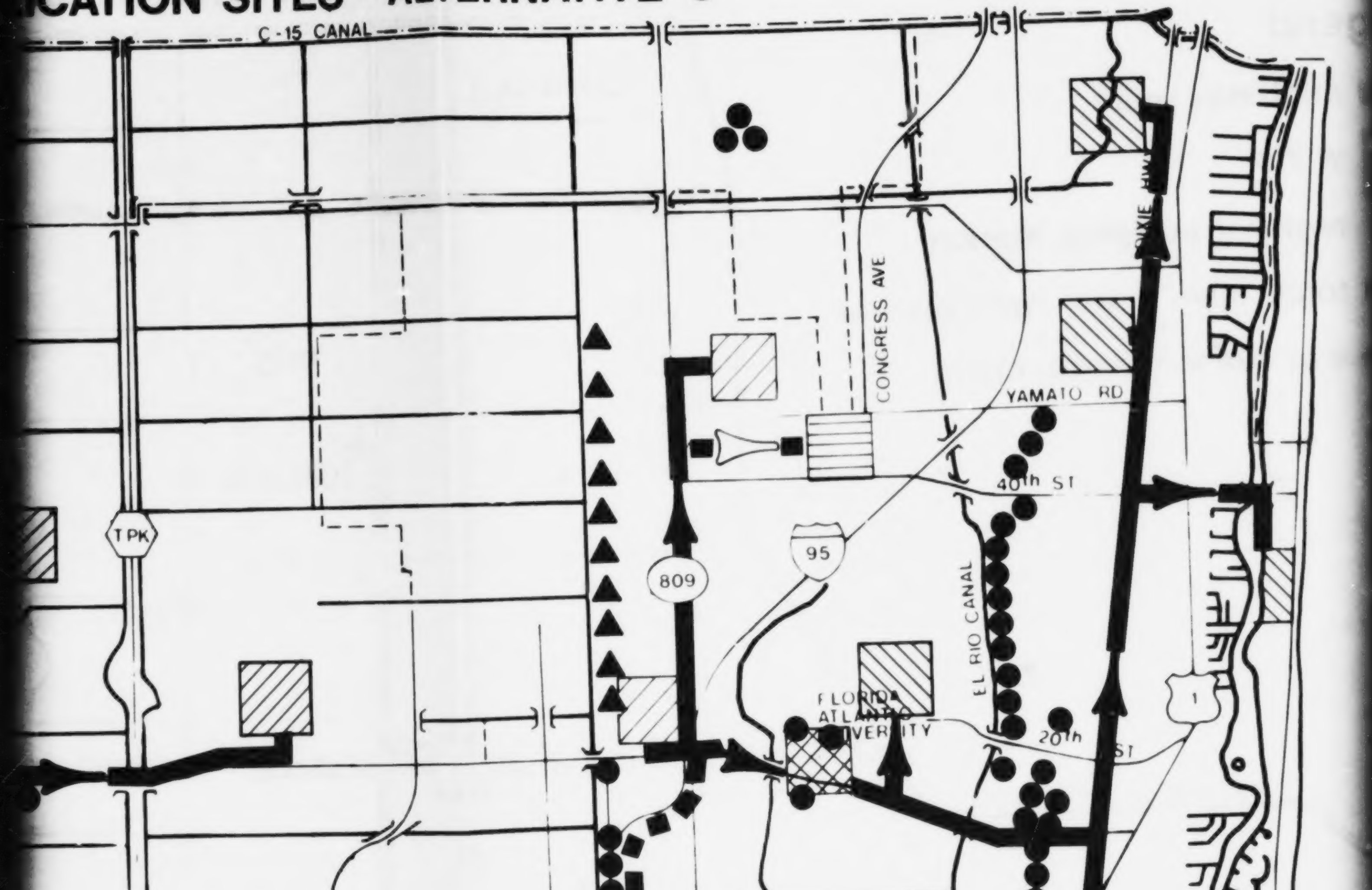


Legend
● existing wells
▲ proposed wells
phase I (1984 - 1994) land application site
phase II (1995 - 2000) land application sites
alternative land application sites
wwtp
transmission lines to land application sites, treated wastewater
lines to alternate sites
CLINT MOORE
441
808
BROWARD COUN

SOURCE: RSBW, NEAR TERM MASTER PLAN FOR WATER SUPPLY, APR. 1979
RSBW, FEB. 1980
SPBUC, FEB. 1980

SOUTHERN REGION PALM BEAC

ICATION SITES - ALTERNATIVE 5


C-15 CANAL
CONGRESS AVE
YAMATO RD
40th ST
DIXIE HWY
TPK
95
809
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST
1
PALMETTO PK. RD
CAMINO REAL
POWERLINE
S. W. 18th ST.
HILLSBORO CANAL
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1" = 4
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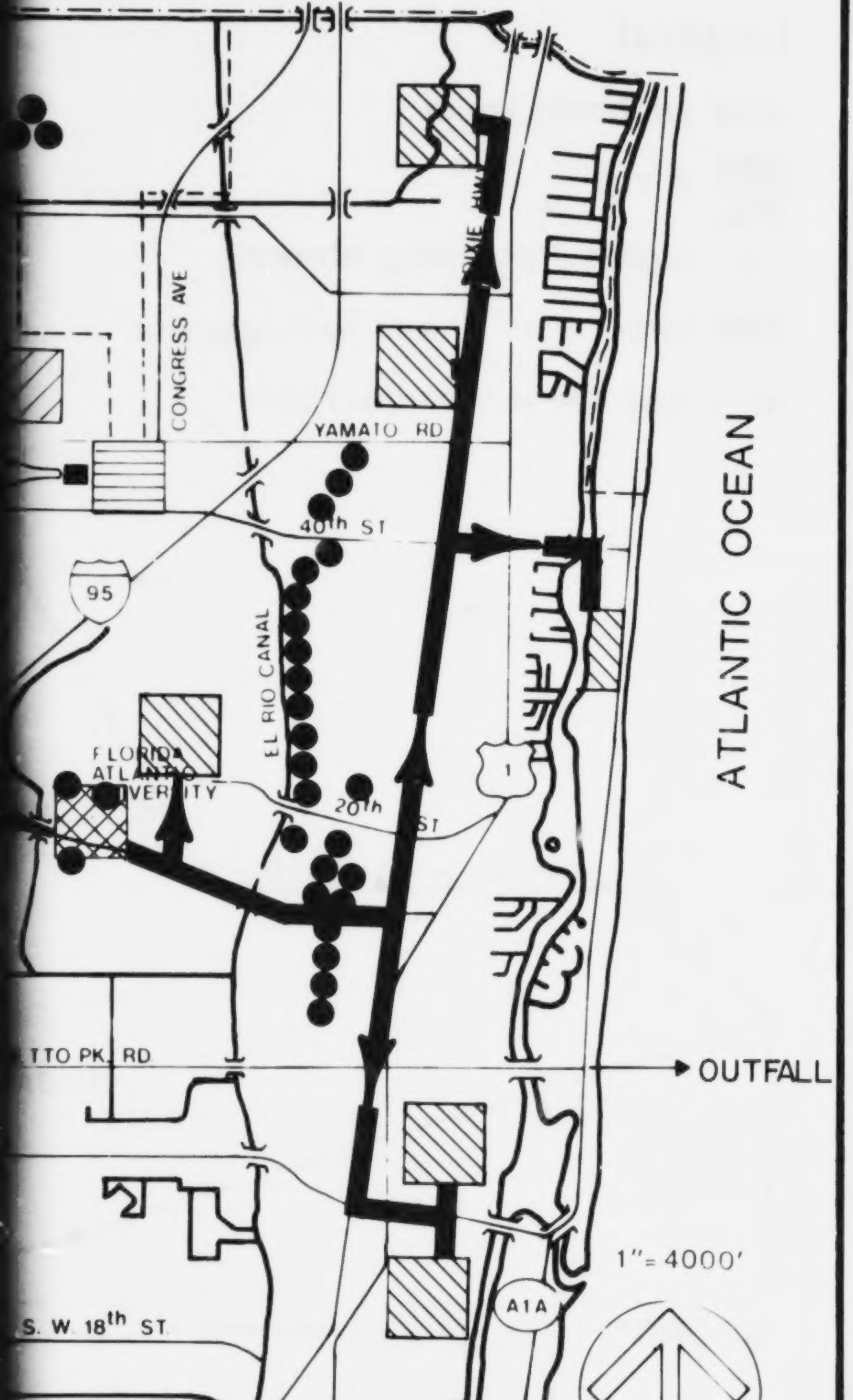
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

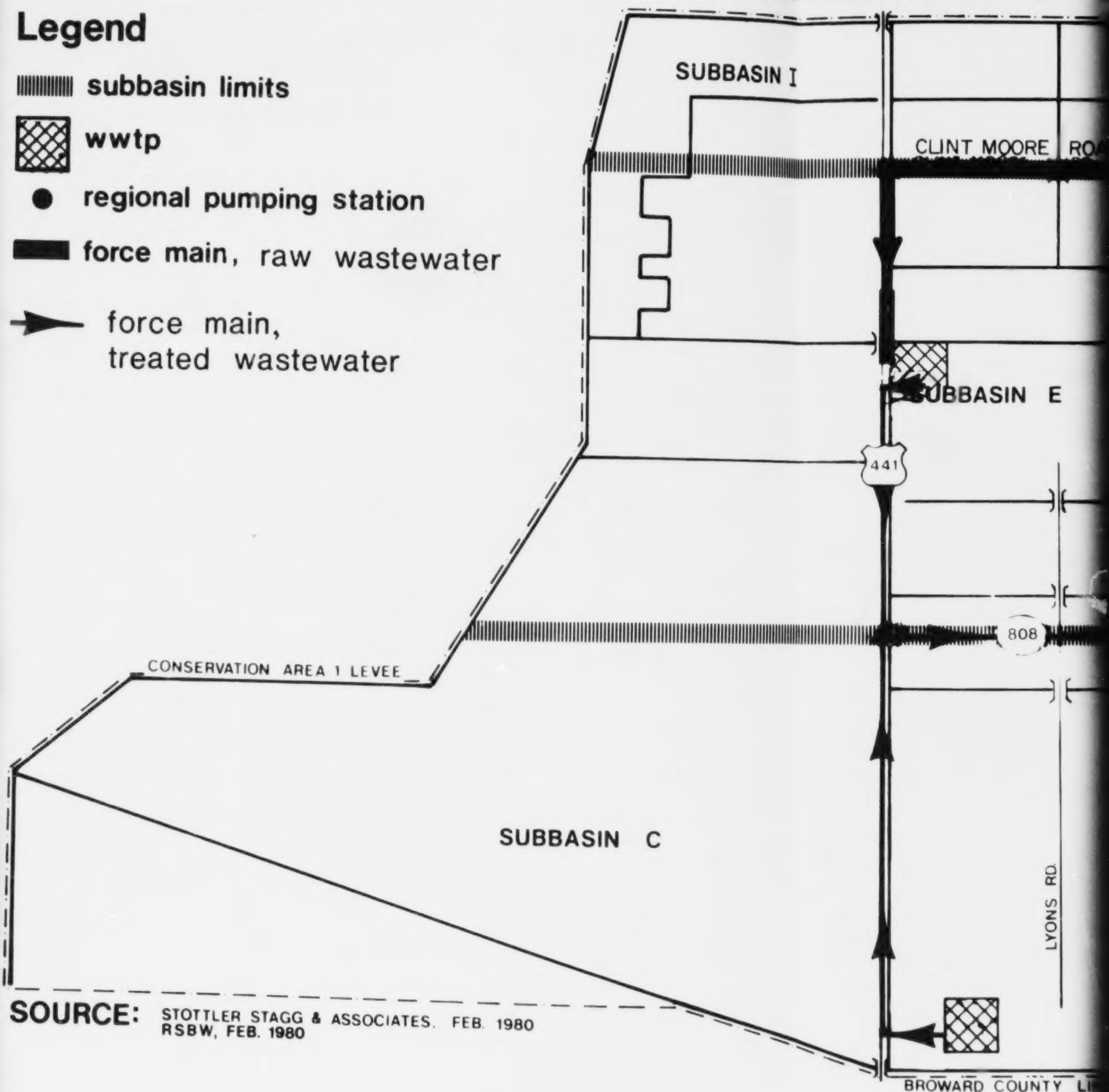
COUNTY 201 AREA EIS



CONGRESS AVE
DIXIE HWY
YAMATO RD
40th ST
95
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST
1
ATLANTIC OCEAN
ETTO PK. RD
OUTFALL
A1A
1"= 4000'
S. W. 18th ST
ND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

fig II-10

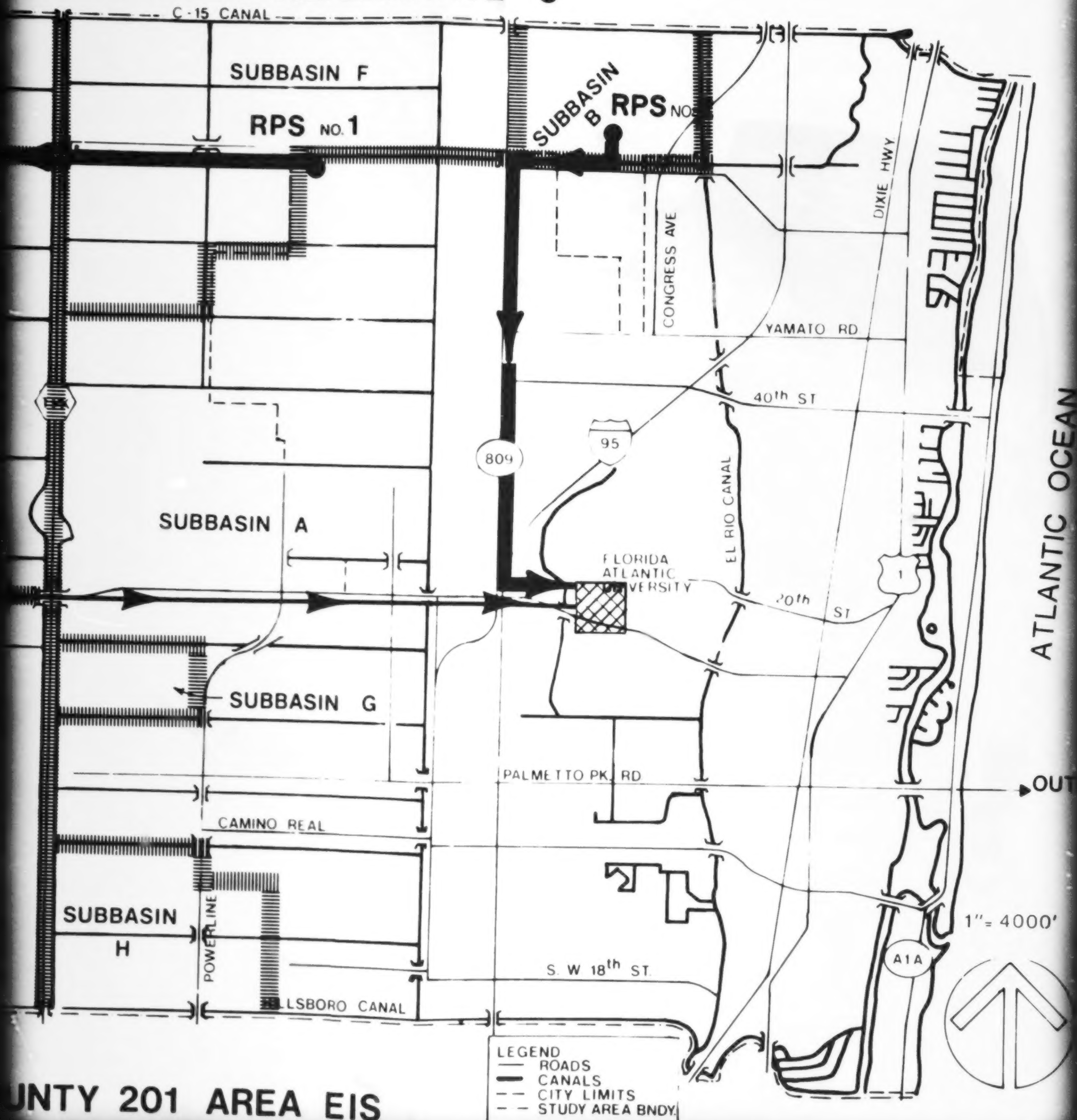
WASTEWATER TREAT


Legend
subbasin limits
wwtp
regional pumping station
force main, raw wastewater
force main, treated wastewater
SUBBASIN I
CLINT MOORE ROA
SUBBASIN E
441
808
CONSERVATION AREA 1 LEVEE
SUBBASIN C
LYONS RD.
BROWARD COUNTY LI

SOURCE: STOTTLER STAGG & ASSOCIATES. FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM BEACH

ENT SYSTEM - ALTERNATIVE 6


C-15 CANAL
SUBBASIN F
RPS NO. 1
SUBBASIN B
RPS NO.
CONGRESS AVE
DIXIE HWY
YAMATO RD
40th ST
809
95
EL RIO CANAL
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
20th ST
1
ATLANTIC OCEAN
SUBBASIN G
PALMETTO PK. RD
OUT
CAMINO REAL
SUBBASIN H
POWERLINE
1" = 4000'
A1A
S. W 18th ST.
HILLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

UNTY 201 AREA EIS

fig

Alternative 7:

Alternative 7 consists of one regional plant at Glades Road with the same type of treatment, capacity, discharge, and pumping station configuration as Alternative 1. No centralized service would be provided to the land classified as unique agricultural land in Figure II-12. Densities in the other parts of the County Planning Area were assumed to increase so the total population level would be the same as for the other alternatives.

Alternative 8

This alternative is the no Federal action alternative in which no Federal 201 grant money would be given for construction in the Planning Area. It is estimated that the City and the County would expand the existing facilities in the area with 100% local funding if this alternative is chosen. This would mean expansion of the Glades Road Plant to 17.5 MGD to accommodate the City's service area. The three County plants would probably remain in service until their capacities were reached between 1988 and 1990. These plants could then be expanded to 6 MGD each at Sandalfoot and American Homes and .7 MGD at Pheasant Walk with discharge to percolation ponds or to the City's ocean outfall. A third alternative for the County would be pumping all wastewater to the Glades Road Plant for treatment and disposal. An agreement would have to be reached between the City and County concerning the appropriate option for implementation. This alternative is depicted in Figure II-13.

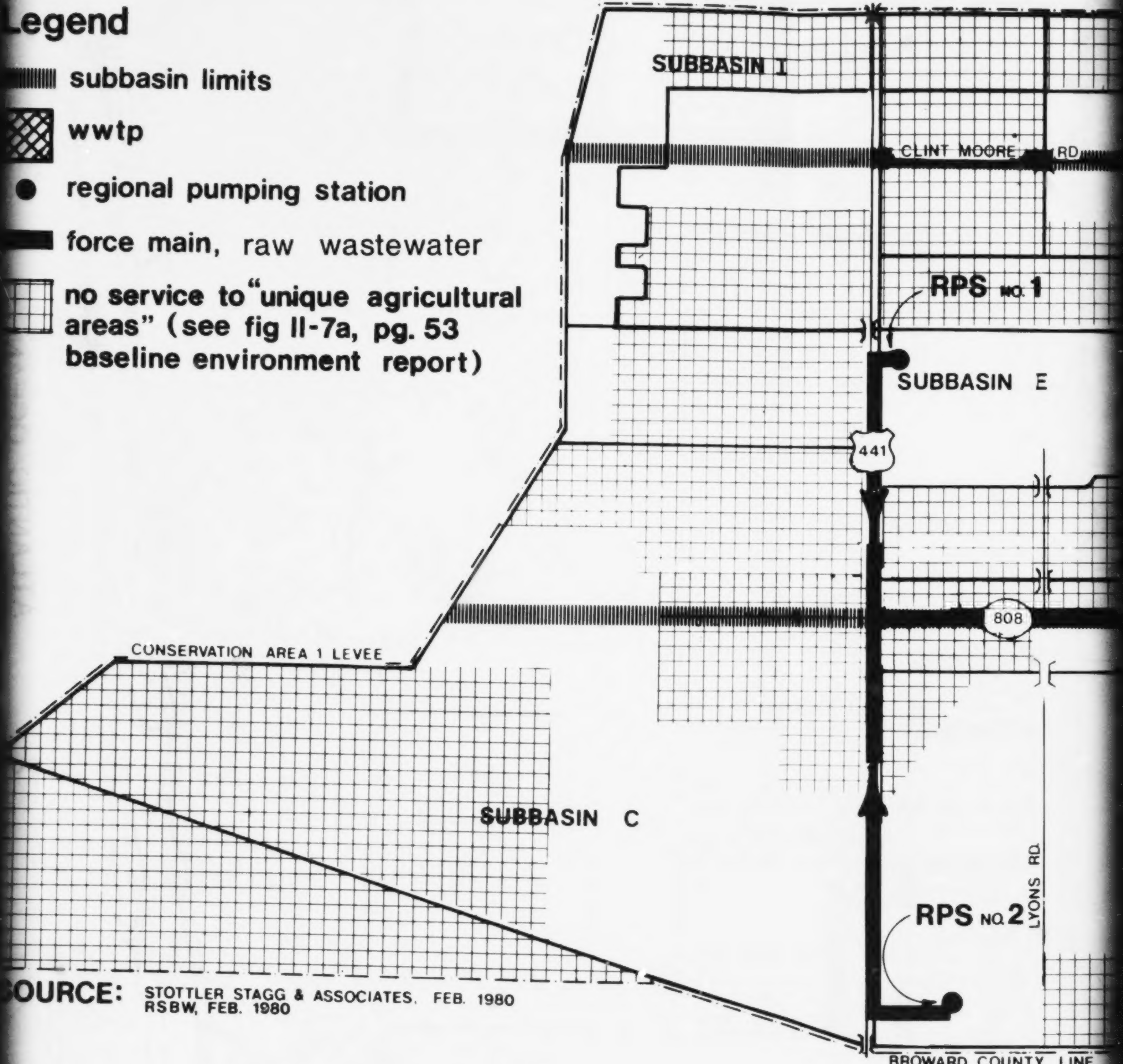
Alternative 9

Alternative 9 is designed to serve as a potential disposal option which could be used in conjunction with any of the other alternatives. This alternative was developed to include a dual water system as used in St. Petersburg, Florida. The configuration for the system is presented in Figure II-14.

Alternative 10

Alternative 10 consists of constructing a system with configuration, treatment level and type of disposal identical to Alternative 1. The pump station, force main to the Glades Road Plant, and the ultimate size of the treatment plant would be downsized so as not to serve that part of the population projected to settle on unique agricultural lands as defined by the SCS. The ultimate capacity of the Glades Road Plant would be 23 MGD.

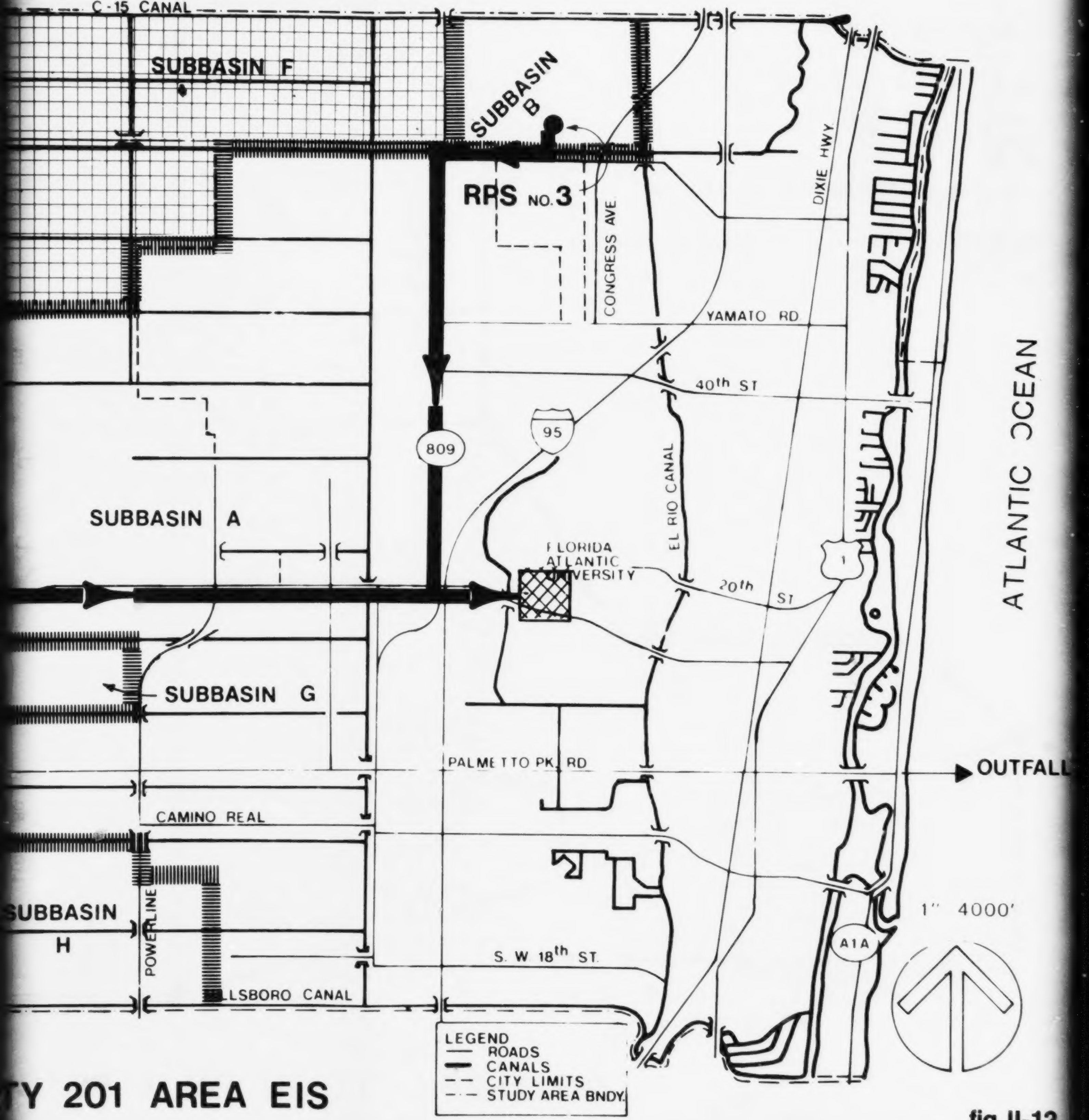
WASTEWATER TREATM


Legend
subbasin limits
wwtp
regional pumping station
force main, raw wastewater
no service to "unique agricultural areas" (see fig II-7a, pg. 53 baseline environment report)
SUBBASIN I
CLINT MOORE RD
RPS NO. 1
SUBBASIN E
441
808
CONSERVATION AREA 1 LEVEE
SUBBASIN C
LYONS RD.
RPS NO. 2
BROWARD COUNTY LINE

OURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM BEACH C

SYSTEM - ALTERNATIVE 7


C-15 CANAL
SUBBASIN F
SUBBASIN B
RPS NO. 3
CONGRESS AVE.
DIXIE HWY
YAMATO RD
40th ST
95
809
EL RIO CANAL
ATLANTIC OCEAN
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
20th ST
1
SUBBASIN G
PALMETTO PK. RD
OUTFALL
CAMINO REAL
SUBBASIN H
POWERLINE
1" 4000'
A1A
S. W. 18th ST.
LLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

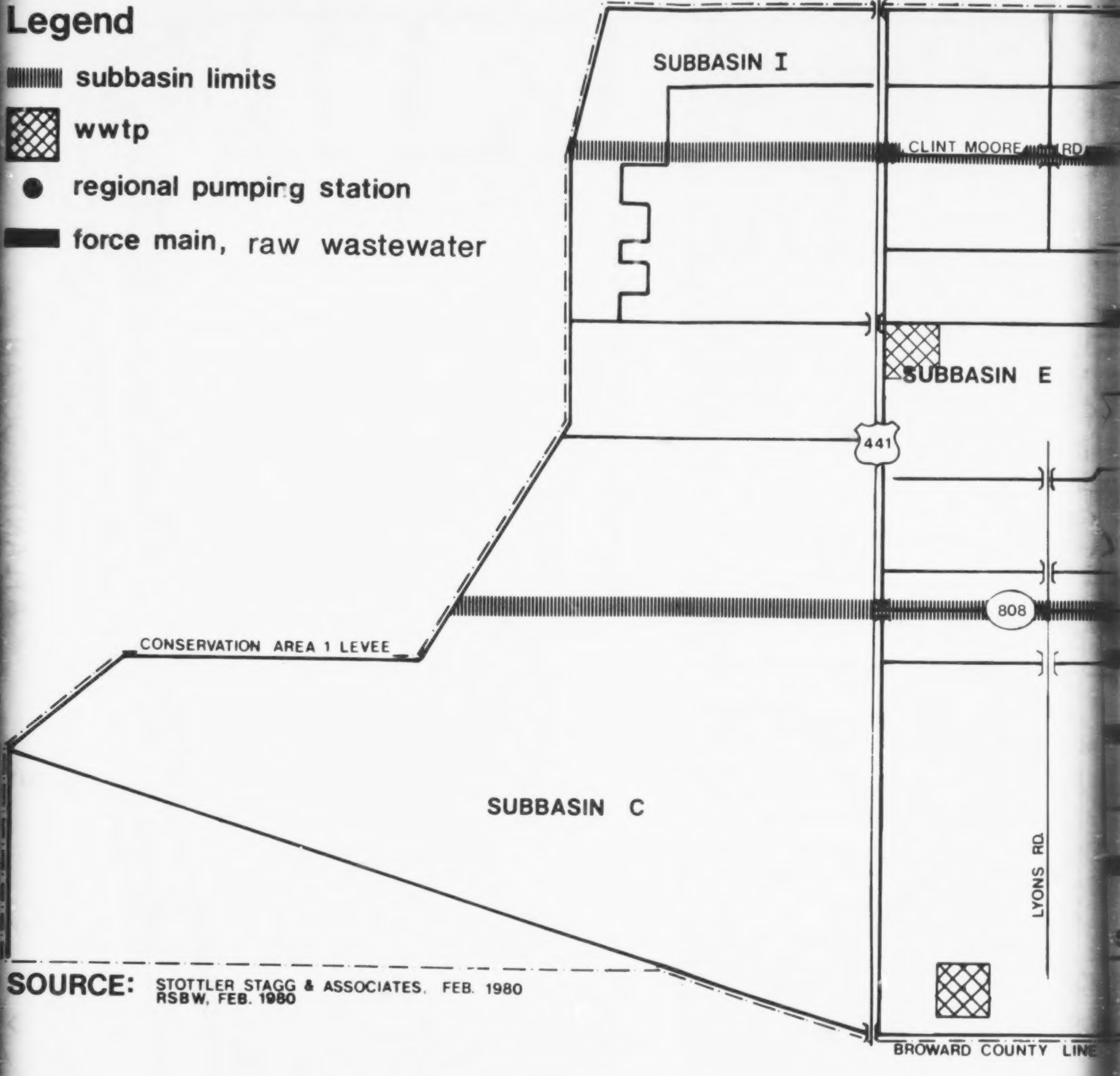
TY 201 AREA EIS

fig II-12

WASTEWATER TREAT

Legend

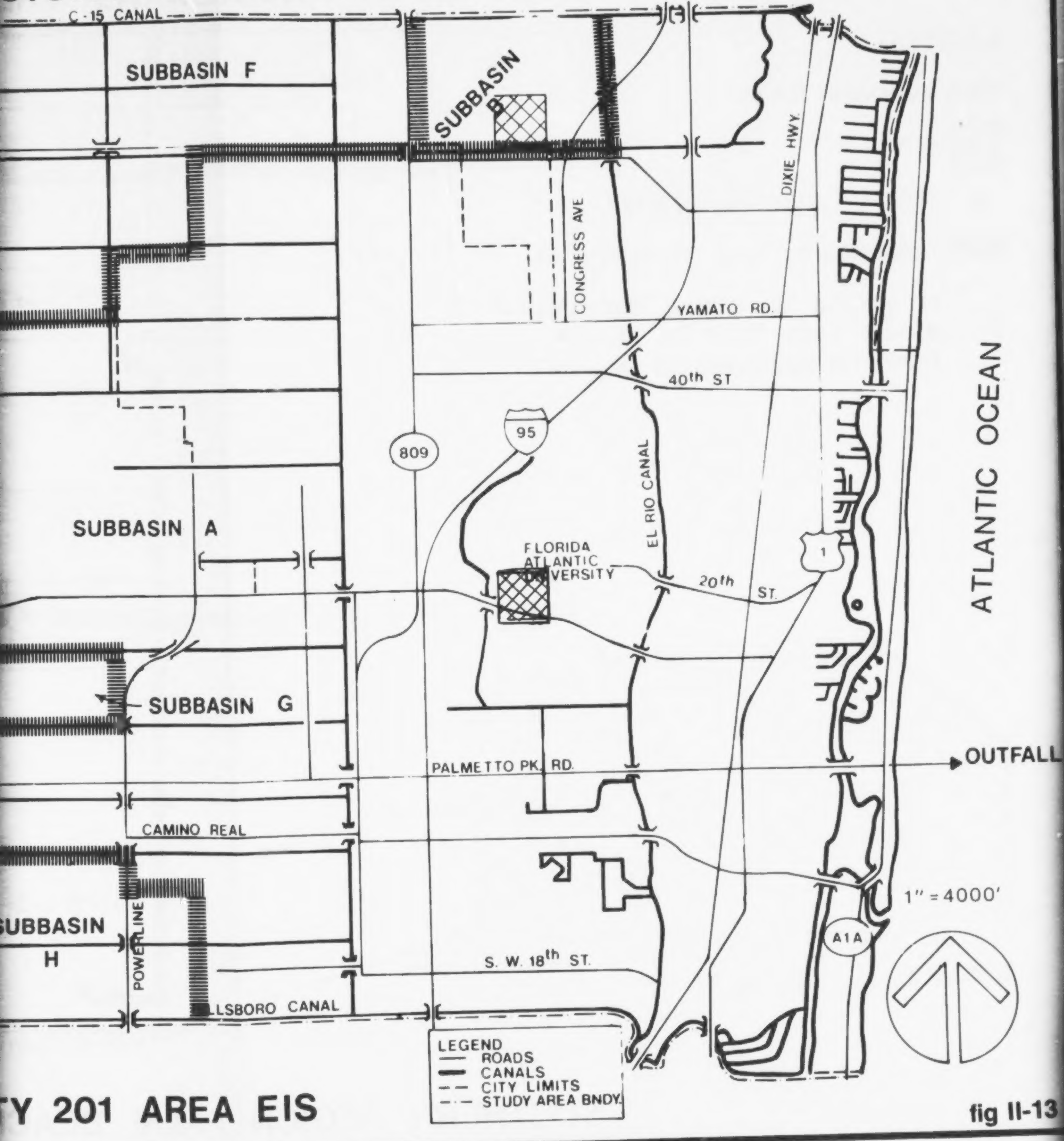
- ▥ subbasin limits
- ▨ wwtp
- ● regional pumping station
- ▬ force main, raw wastewater


SUBBASIN I
CLINT MOORE RD
SUBBASIN E
441
808
CONSERVATION AREA 1 LEVEE
SUBBASIN C
LYONS RD.
BROWARD COUNTY LINE

SOURCE: STOTTLER STAGG & ASSOCIATES, FEB. 1980
RSBW, FEB. 1980

SOUTHERN REGION PALM BEACH

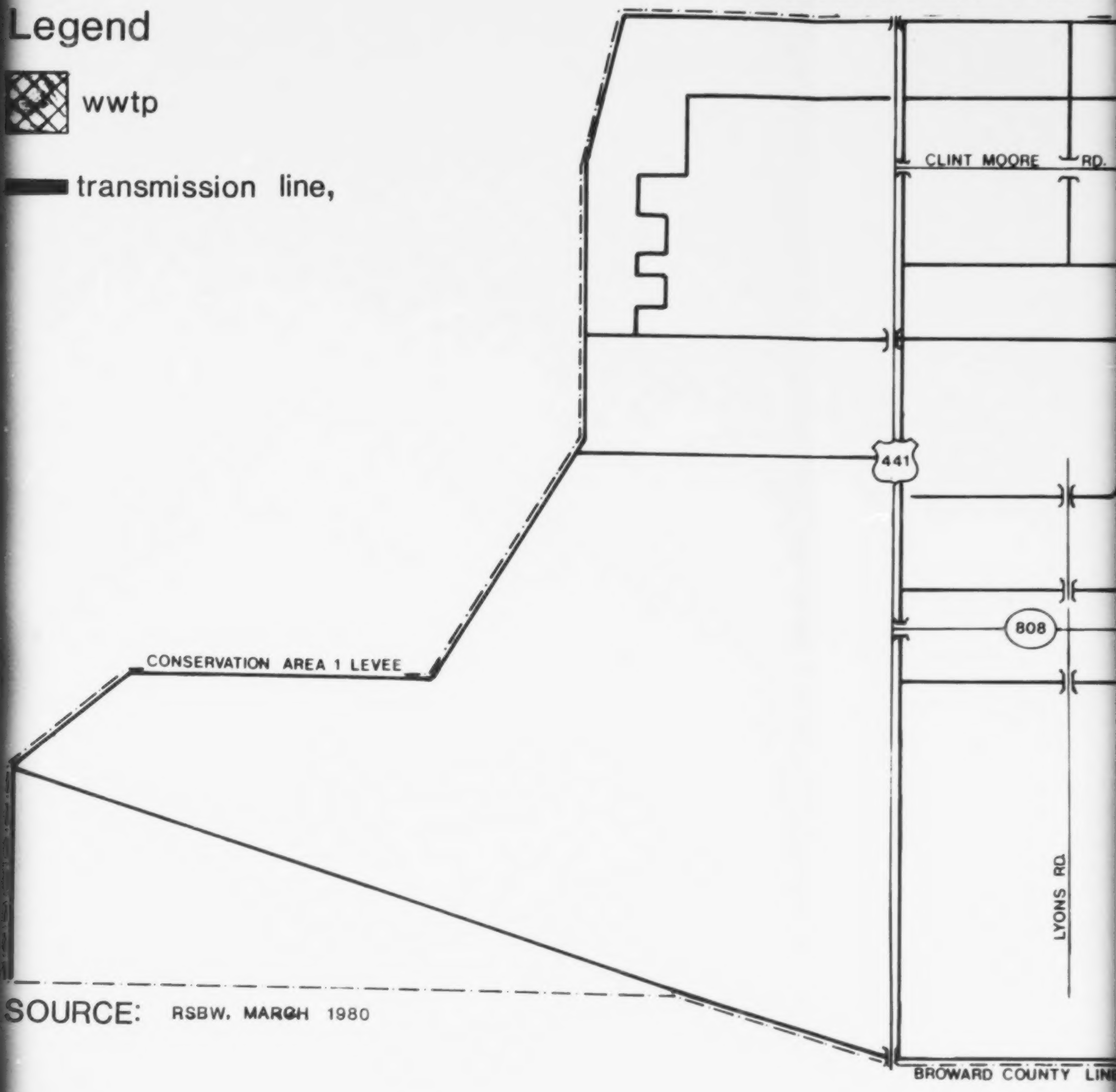
SYSTEM - ALTERNATIVE 8


C-15 CANAL
SUBBASIN F
SUBBASIN B
DIXIE HWY.
CONGRESS AVE
YAMATO RD.
40th ST
95
809
ATLANTIC OCEAN
EL RIO CANAL
SUBBASIN A
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
SUBBASIN G
OUTFALL
PALMETTO PK. RD.
CAMINO REAL
1" = 4000'
SUBBASIN H
POWERLINE
A1A
S. W. 18th ST.
LLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

TY 201 AREA EIS

fig II-13

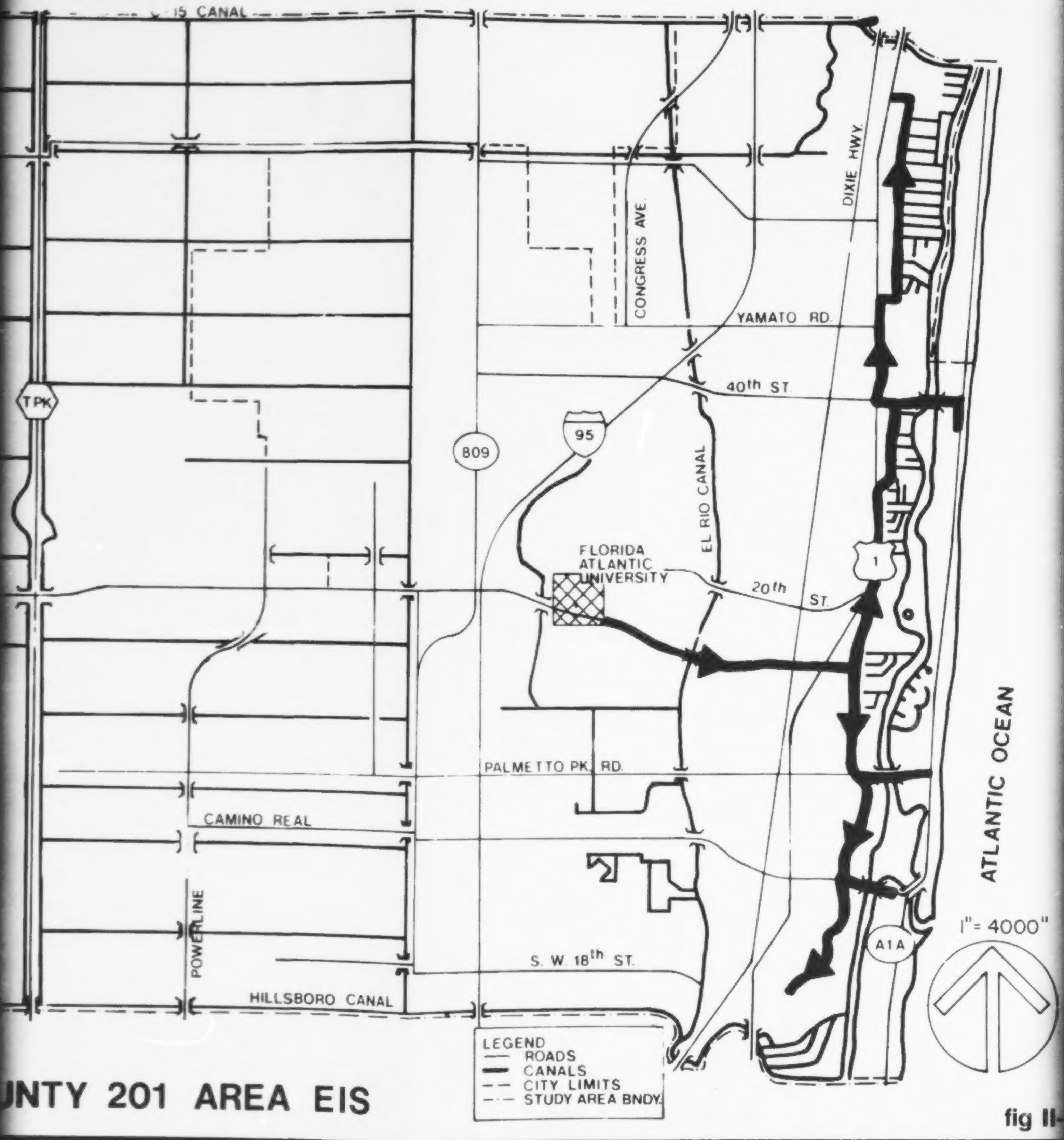
WASTEWATER TREAT


Legend
▨ wwtp
▬ transmission line,
CLINT MOORE RD.
441
808
CONSERVATION AREA 1 LEVEE
LYONS RD.
BROWARD COUNTY LINE

SOURCE: RSBW. MARCH 1980

SOUTHERN REGION PALM BEACH

ENT SYSTEM-ALTERNATIVE 9



15 CANAL
TPK
809
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CONGRESS AVE.
DIXIE HWY.
YAMATO RD.
40th ST.
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST.
1
PALMETTO PK. RD.
CAMINO REAL
POWERLINE
S. W. 18th ST.
HILLSBORO CANAL
A1A
ATLANTIC OCEAN
1"= 4000"
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

UNTY 201 AREA EIS

fig II-

Part G: Cost Evaluation

A summary of the present worth costs for each alternative is presented in Table II-2. A detailed cost analysis for each alternative can be found in the Southern Region, Palm Beach County 201 Plan.

A major conclusion of the cost analysis is that the alternatives involving spray irrigation are more expensive than those associated with the outfall. This is due to the high cost of land in the area and the fact that the outfall is already in existence.

Alternatives 1 and 7 are listed as the most cost effective full service alternatives with a total present worth cost of $26.8 million. These figures, however, are somewhat misleading when compared to Alternatives 3 and 8 which have present worth costs of $33.2 and $34.9 million respectively. The difference in the cost calculations results from the fact that Alternatives 1 and 7 provide service to subbasins F and I while Alternatives 3 and 8 do not. A $1,000 cost is estimated per septic tank user in the two subbasins in Alternatives 3 and 8 while no cost for collector lines is assessed to the sames users in Alternatives 1 and 7. When the difference in the cost calculations for these two subbasins is accounted for, the cost of these four alternatives is almost identical.

Part H: Implementability

All the alternatives except 4 and 8 require an agreement between the City of Boca Raton and Palm Beach County outlining terms of Boca Raton's agreement to dispose or treat and dispose of Palm Beach County's wastewater. It is expected that the agreements required under each of the alternatives could be worked out to the satisifaction of both local governments.

It is believed that implementability is not a critical element in the selection of the preferred alternative. Each alternaive has been determined to be fully implementable. Clearly, however, alternatives involving land application would be more difficult to implement due to the difficulty in acquisition of land.

CHAPTER III - AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES AND MITIGATIVE MEASURES

Part A: Introduction

This chapter summarizes the existing natural and man-made environment of the Planning Area, discusses the environmental impacts of the alternatives and proposed possible measures to mitigate these impacts. The purpose of the environmental setting summary is the establishment of existing baseline conditions in the area. The impacts of the various alternatives, including the no Federal action alternative, are gauged against these existing conditions.

Part B: Affected Environment and Environmental Consequences of the Alternatives

Population

The rate of population growth in Palm Beach County has consistently exceeded that of Florida and the United States for the last three decades. This growth, which exceeds national growth by 40% and state growth by 15%, is primarily due to in-migration.

The fastest growing segment of the County's population is the over 65 age group with approximately one in every five county residents falling into this category. This compares with one in every ten nationally.

About 3 percent of Boca Raton's residents are black as compared to 13 percent for the County and 15 percent for the State. Very few Hispanic residents are present within the Planning Area.

Total population for the Planning Area was estimated to be 76,153 in 1980. This was divided between 62,596 in the City service area and 13,557 in the County service area. Total population is expected to grow to 257,566 in the year 2000. This will include 158,151 within the City service area and 99,415 within the County service area.

Disaggregations of future population estimates by the sub-basins shown in Figure II-1 are presented in Table III-1.

TABLE III-1

DISAGGREGATIONS OF ESTIMATED FUTURE POPULATIONS

Subbasin[1]	Estimated Subbasin Population For Future Years				
	1980	1985	1990	1995	2000
A	62,596	86,485	119,179	138,758	158,151
B	374	709	2,689	4,891	5,493
C	10,397	15,946	24,917	30,857	34,352
D	382	606	1,042	1,240	1,315
E	696	3,166	9,961	17,328	24,721
F	679	2,454	4,698	7,973	9,932
G	141	836	1,854	2,605	3,361
H	669	3,342	7,054	9,784	12,477
I	219	994	3,129	5,442	7,764
Total	76,153	114,538	174,523	218,878	257,566

(1) See Figure II-1 for subbasin locations.

All of the alternatives will provide 75% Federal funding for the total year 2000 population projections except Alternatives 3, 8, and 10. All of these alternatives would provide for less population on the unique agricultural lands in Palm Beach County. However, Palm Beach County land use control policy has so far encouraged almost total conversion of these agricultural lands to urban uses. Most of the area has already been zoned for residential development at densities which would require centralized sewer service. Even some areas projected for less extensive development in the Palm Beach County Comprehensive Plan have been given development approvals. A continuation of the current development policy in the County will lead to almost complete development of the Planning Area within the next 20 years.

It is doubtful that the County or major developers would let the lack of Federal funding for wastewater treatment and disposal alter this growth rate. It is likely that any necessary facilities to service the full projected population level would be provided by 100% local funding.

It is likely that the population densities and locations as well as the total population levels discussed above will be the same whichever alternative is selected. Alternative 7 attempts to preserve some of the unique agricultural lands by increasing densities in other areas to equal the lack of increased population on the agricultural lands. However, County development policy has already committed much of the agricultural lands to urban development and there is no reason to expect any major changes in the direction of this policy.

Economic Conditions

The EIS study area is part of a larger economic region which includes much of southeast Florida, especially Broward and Palm Beach counties. The trade sector is the largest employer in this area while services and trade are the largest sources of wage and salary income. The largest individual employers in the area are IBM and the Boca Raton Hotel and Club. Over half of the income within the planning region comes from sources other than employment. These include income from dividends interest and rent, and transfer payments. These two indications identify the economy of the area as basically tourist-retirement in nature.

An important economic trend is the decline in agriculture in the two counties. Over the past two decades, agricultural activity has steadily moved out of Broward and the urbanizing portions of Palm Beach County. This has resulted in a decline in the percentage of total income and employment from agriculture in these two counties.

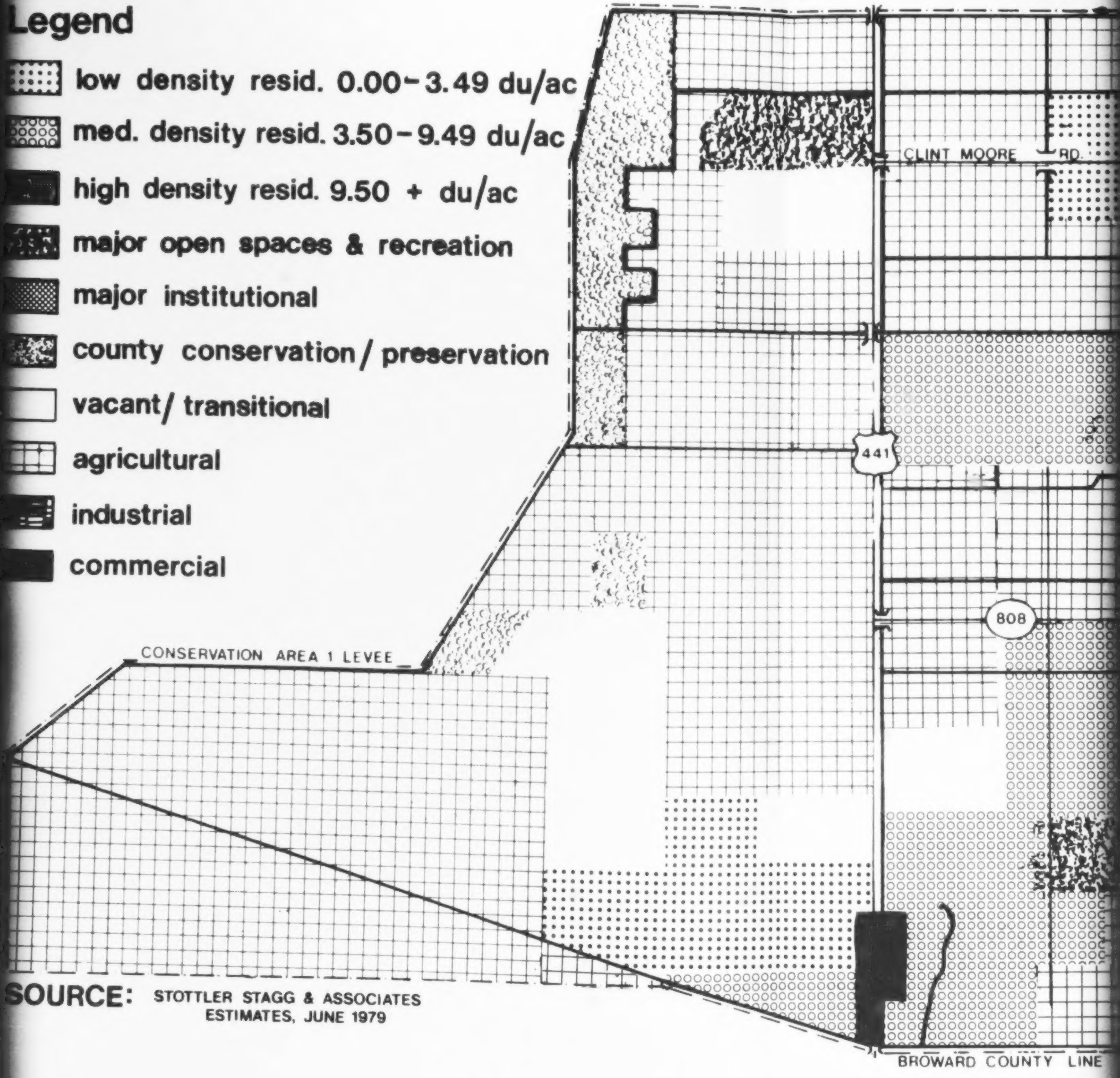
The continued expansion of the wastewater treatment system is necessary for the continuation of the current high level of residential and associated construction activity. This expansion would be provided in all the alternatives except Alternative 8, the no Federal action alternative. The implementation of Alternatives 7, 8, and 10 would help to slow the continued decrease in economic activity related to the agricultural industry. However, the development strategy currently being carried out by local government in the area will almost certainly lead to continued development throughout the Planning Area. This will mean continued expansion of the construction industry and local service economy and continued decline in the agricultural industry.

Land Use

The existing land use pattern is shown in Figure III-1. In areas where land uses are mixed, only the predominant use is shown. Large residential development project land uses are shown as the average residential density for the particular project. Areas where construction is underway are shown as being completed. This figure, as well as subsequent ones within in this section, is broadly generalized. Detailed information regarding specific land use classification within large mixed use developments is available from the local planning departments.

Existing urban development is concentrated east of I-95. High-density residential development predominates along the sourthern portion of A1A. There are smaller areas of high-density residential use in the northeast portion of the city, adjacent to the south side of Spanish River Park, in the Sandalfoot area and in Century Village.

1980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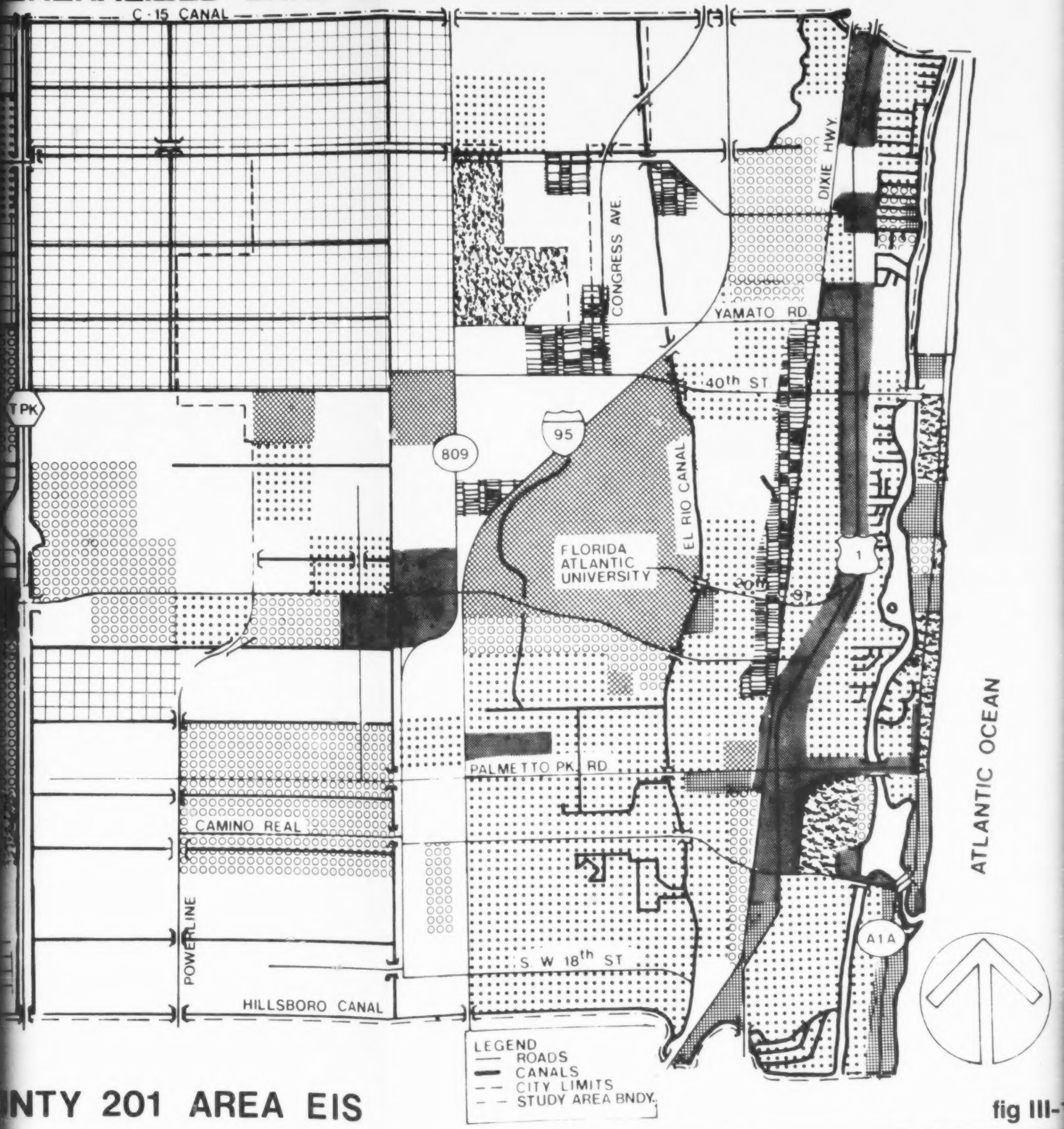
med. density resid. 3.50-9.49 du/ac
high density resid. 9.50 + du/ac
major open spaces & recreation
major institutional
county conservation/preservation
vacant/ transitional
agricultural
industrial
commercial
CLINT MOORE RD.
441
808
CONSERVATION AREA 1 LEVEE
BROWARD COUNTY LINE

SOURCE: STOTTLER STAGG & ASSOCIATES ESTIMATES, JUNE 1979

SOUTHERN REGION PALM BEACH C

ENERALIZED LAND USE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DIXIE HWY.
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FLORIDA ATLANTIC UNIVERSITY
20th ST
1
PALMETTO PK. RD
CAMINO REAL
POWERLINE
S. W 18th ST
HILLSBORO CANAL
A1A
ATLANTIC OCEAN
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

UNTY 201 AREA EIS

fig III-1

Medium-density residential developmment within the City is located south of Florida Atlantic University (FAU), adjacent to the central business district and within the U.S. 1-Dixie Highway corridor. The central Reserve Area has medium-density developments closely associated with large open space areas. There are also medium-density areas adjacent to Century Village and Sandalfoot. As of February 1979, there were 674 duplex dwelling units and 10,837 multi-family dwelling units within the Boca Raton limits.

Low-density residential development is the principal land use in the developed areas. The area west of the Turnpike has several large single-family subdivisions under development, generally in close proximity to U.S. 441. The Reserve Area is characterized by housing developments interspersed within semi-public golf courses and other recreation facilities. The Pheasant Walk subdivision has completed 146 homes as part of a 1,500-unit project.

Single-family development dominates most of Boca Raton. The largest concentrations are in the southern and eastern portions of the City. High-value housing is generally located around waterways, principally the Intracoastal Waterway, open spaces and the beach. As of February 1979, there were 10,837 single-family dwelling units in Boca Raton.

The average price of a new dwelling unit in the area in 1978 was $75,000.

Commercial land uses are directly associated with major thoroughfares. The Sandalfoot area has strip neighborhood commercial uses along U.S. 441. There is a neighborhood commercial area at the intersection of Glades Road and the Turnpike. A major office center and general commercial area is under development at Glades Road and Military Trail. An office center-shopping center development is expanding at 1-95 and Palmetto Park Road. There are a wide variety of office buildings, typical strip commercial uses, and four major shopping centers on the seven-mile strip of U.S. 1 within the Planning Area. There are three large hotels located in close proximity to the Inlet.

In 1967, the City had 8.51 acres of commercial land use per 1000 population. In 1978, there were 8.55 acres of commmercial land use per 1000 population. Based on this information, 2,203 acres of commercial land will be needed in the Year 2000. Approximately 1376 acres of existing and zoned commercial land currently exists.

Industrial uses are located between NW Second Avenue and the F.E.C. Railroad between 51st Street and Palmetto Park Road. IBM, the study area's largest employer, has a light manufacturing-office facility on Yamato Road west of I-95. Four light manufacturing facilities are scattered throughout the developing industrial park north of the IBM facility. There are no industrial land uses elsewhere in the Planning Area.

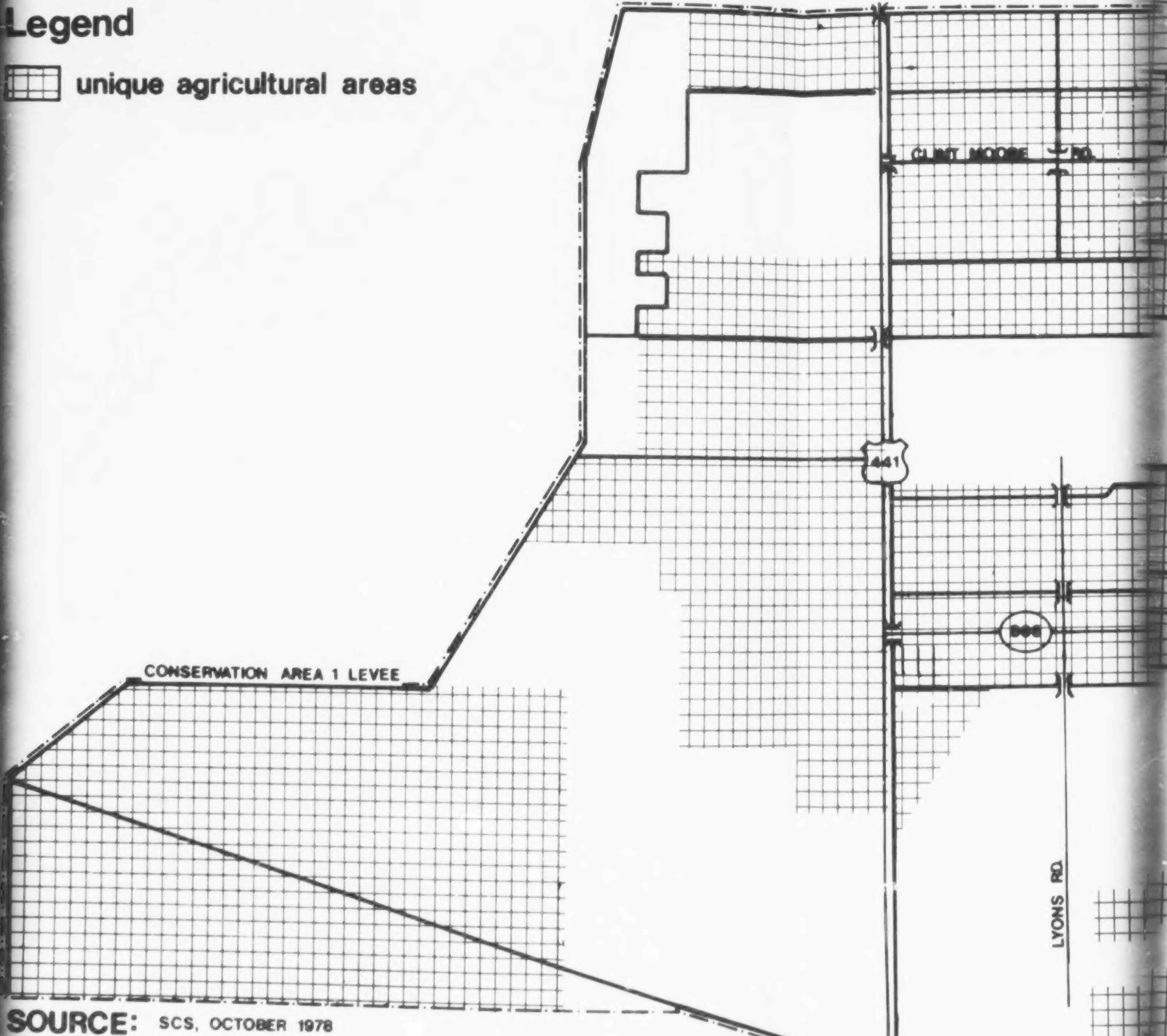
In 1967, there were 6.01 acres of industrial land use per 1000 population within Boca Raton. By 1978 this ratio had declined to 5.80 acres per 1000 population. Based on this information, 1,494 acres of industrial land will be needed in the Year 2000. Approximately 1,845 acres of industrially built and zoned land currently exist.

The major institutional land use is FAU, a state-supported institution with the full range of graduate and undergraduate programs. The current enrollment approximates 8,000 on its 1,200-acre campus. There are numerous religious institutions scattered throughout the area with the Bibletown development adjacent to the Community Center being the largest.

All of the public recreation facilities, with the exception of the Loxahatchee National Wildlife Refuge and a small neighborhood park in University Park, are located east of I-95 between 40th Street and Palmetto Park Road. There are 325 acres of park and playfield facilities. In addition, the City owns 177 acres of beachfront property and the County has acquired an 11-acre park site adjacent to the south side of the Inlet.

There are 11,000 acres (1978) of land with agricultural exemptions in the western and north-central portions of the Planning Area. Pasture lands predominate west of the Sandalfoot area except for the southwesternmost portion of the Planning Area. Approximately 4,000 acres of the 11,000 acres are occupied by winter vegetable crops. The Palm Beach County Cooperative Extension Service has estimated that the value of the winter vegetable crops in the Planning Area alone exceed $20 million annually. Eastern Palm Beach is the northernmost limit of the Florida winter vegetable crop. See Figure III-2 for a map of unique agricultural lands as identified by the Soil Conservation Service.

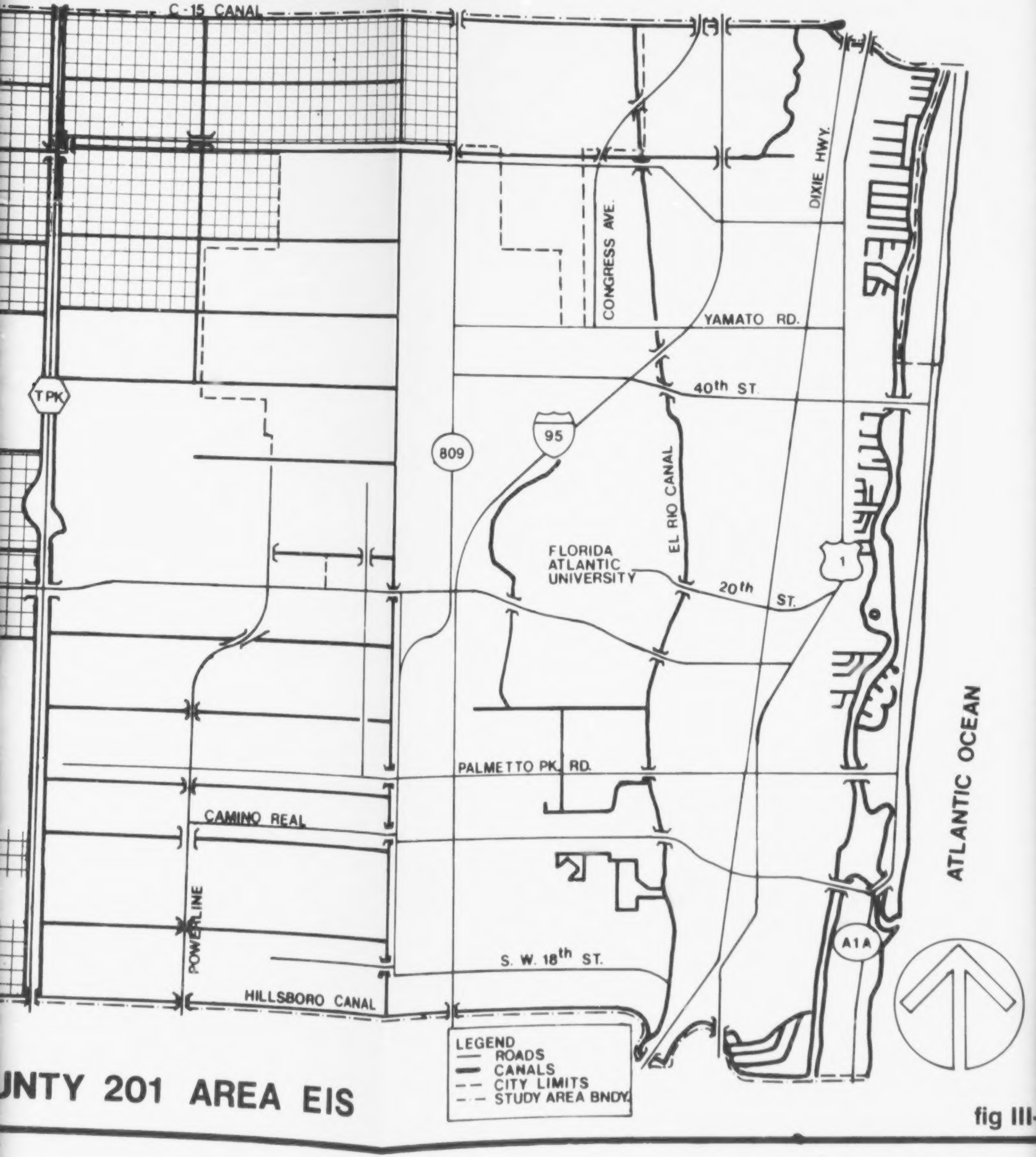
UNIQU


Legend
unique agricultural areas
CLINT MOORE RD.
441
808
CONSERVATION AREA 1 LEVEE
LYONS RD.
BROWARD COUNTY LINE

SOURCE: SCS, OCTOBER 1978

SOUTHERN REGION PALM BEACH C

UE AGRICULTURAL AREAS


C-15 CANAL
CONGRESS AVE.
DIXIE HWY.
YAMATO RD.
40th ST.
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EL RIO CANAL
FLORIDA
ATLANTIC
UNIVERSITY
20th ST.
1
ATLANTIC OCEAN
PALMETTO PK. RD.
CAMINO REAL
POWERLINE
A1A
S. W. 18th ST.
HILLSBORO CANAL
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

UNTY 201 AREA EIS

fig III-2

Existing planning and land development control is vested in the City and the County. Both agencies have a variety of land use development regulations that provide for drainage, tree protection, recreation sites and other similar considerations within their subdivision and zoning ordinances.

Both Boca Raton and Palm Beach County have adopted Comprehensive Plans. These Plans promulgate policies that control the development of land uses, housing, transportation, recreation, sanitary sewer, solid waste, drainage, potable water and utilities. The Plans also include Conservation, Intergovernmental Coordination and Coastal Zone Protection policies.

The planning efforts of the City and the County are supplemented by the Area Planning Board of Palm Beach County (APB) and the Treasure Coast Regional Planning Council (TCRPC). Both organizations are funded by Federal, state, and local sources. TCRPC includes Palm Beach, Martin, Indian River, St. Lucie and Okeechobee Counties.

By far the most significant future land use trend is the almost total destruction of winter vegetable crop production. The County's Comprehensive Plan shows that only the southwesternmost seven square miles of the Planning Area will remain in agricultural use. That portion of the area north of the Hillsboro canal is used as pasture while the portion south of the Canal is primarily used for winter vegetable crops.

An examination of available data shows that there are enough existing units and dwelling units within approved projects to accommodate more than the year 1995 projected population. It should also be noted that the number of units permitted by the present zoning in Boca Raton will not exceed the dwelling unit limit required by the City Charter. In fact, 738 more dwelling units could be built within the Charter limitations. The County has approved and recommended by current zoning 30,347 more units than necessary to accomodate the Year 2000 population.

The reader should be aware that projects often do not build out to their authorized capacity. The respective comprehensive plans are not necessarily limiting their recommendations to the Year 2000. That is, at least in the case of Boca Raton, the limit is a desired population level which may be reached after the Year 2000.

Future commercial land uses will fill in the remaining vacant Federal Highway frontage. A regional shopping center is under construction at Glades Road and Military Trail. No other significant areas of commercial land use are proposed. Several of the large land developments have neighborhood/convenience areas within the projects.

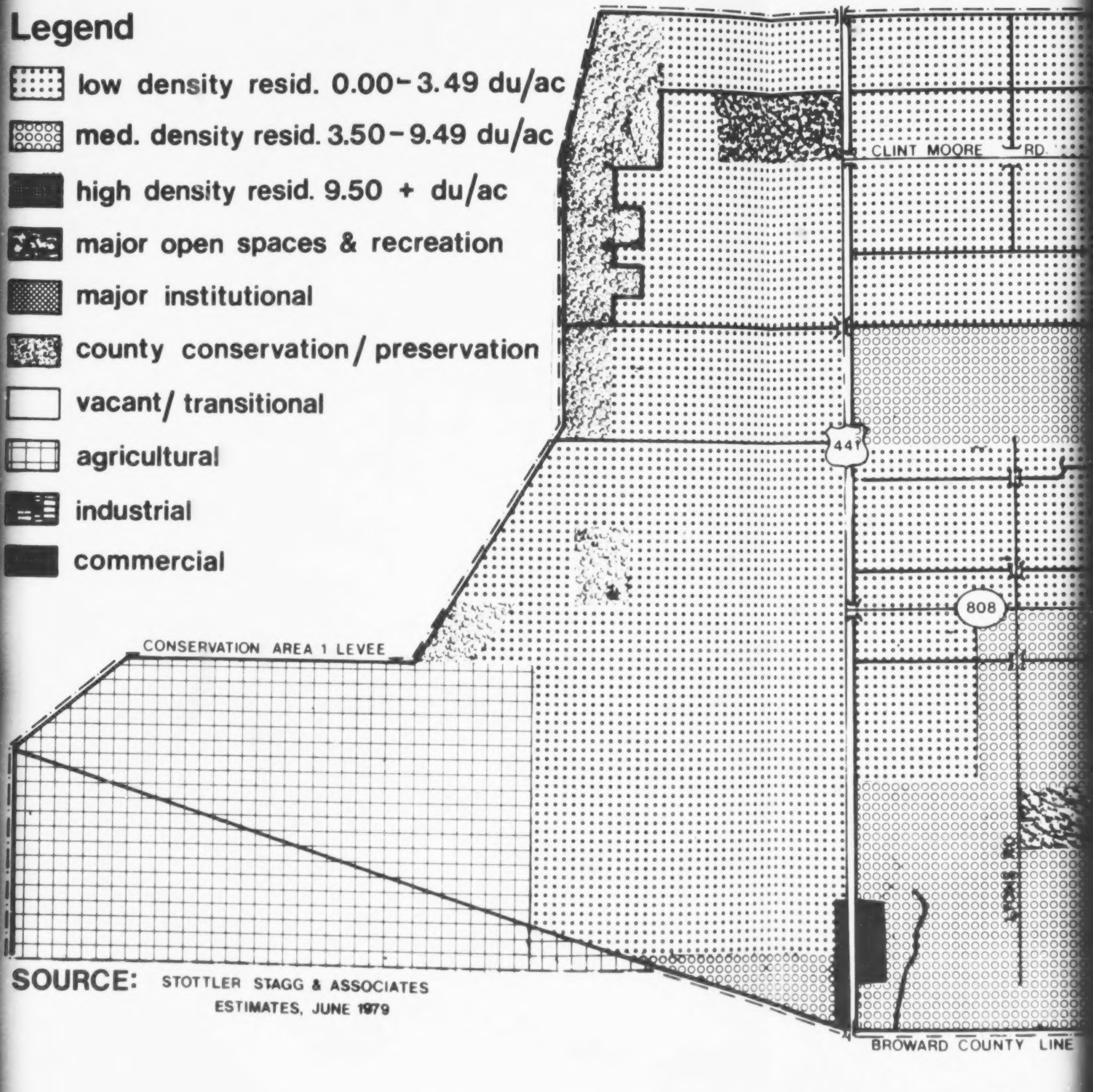
Figure III-3 graphically depicts the anticipated land use patterns for the Year 2000. The reader is cautioned that these maps represent summarization of information provided by the City and the County and should not be used for site analysis.

The following statements summarize the land use section:

- Approved and projected development will convert 11,000 acres of unique agricultural to urban use.
- Existing and approved projects contain more dwelling units than the projected needs for the year 1995.
- The total number of units in the Planning Area exceeds the projected year 2000 needs.
- The total number of dwelling units will accomodate a population of 336,458 or a 23 percent increase above the current population projections for the Year 2000 assuming all the projects build out to the extent planned.

Table III-2 shows the approximate number of residences in 1980 within 500, 1000, 2000 and 3000 feet of the regional pump stations and treatment plant sites. The estimates were developed by using January 1979 aerial photography and windshield verification in February 1980. The estimates presented are accumulative. The Sandalfoot plant has some strip commercial uses within 3000 feet of the plant. The Pheasant Walk plant has eight light industrial uses within 3000 feet of the site.

2000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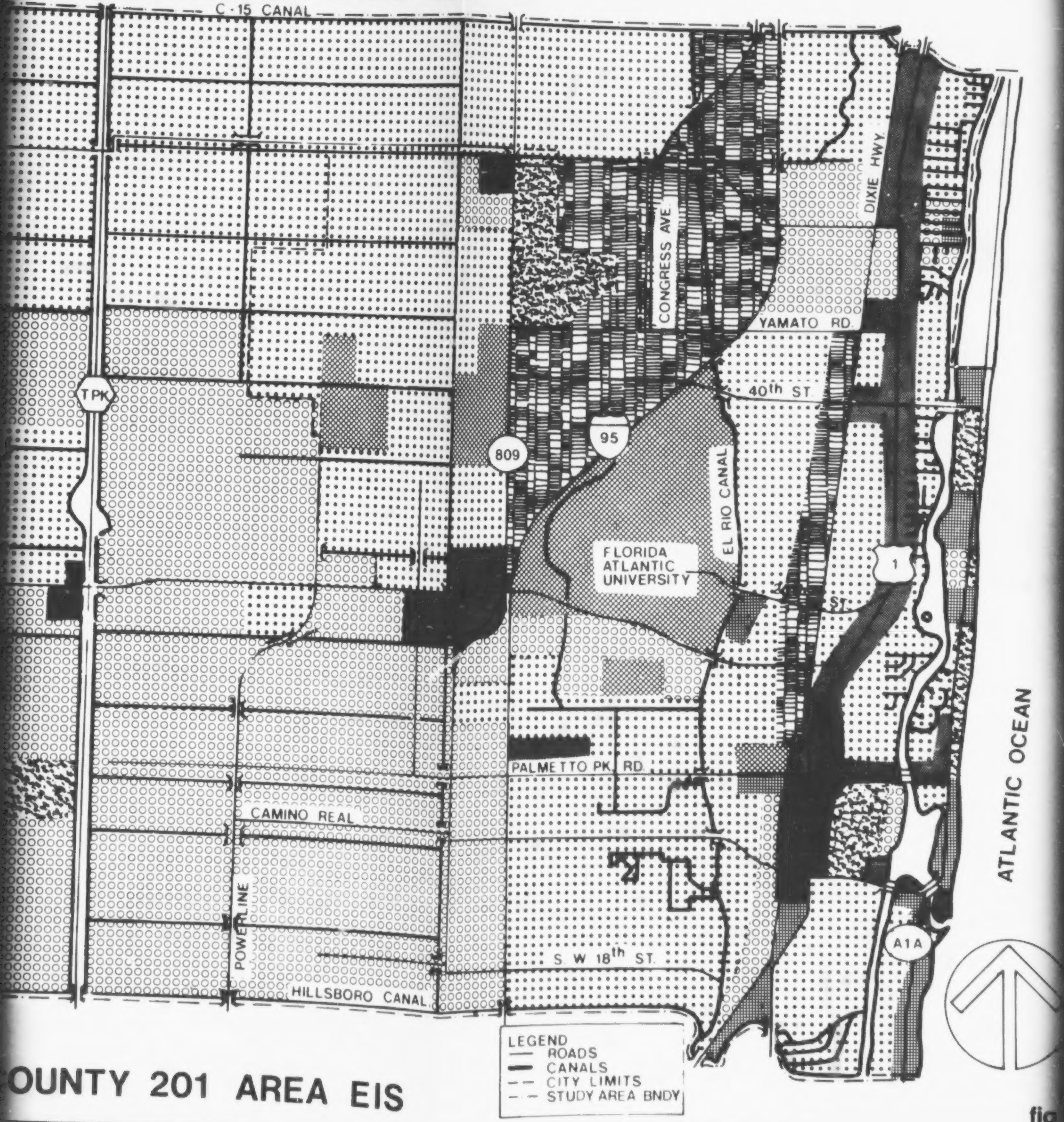
low density resid. 0.00-3.49 du/ac
med. density resid. 3.50-9.49 du/ac
high density resid. 9.50 + du/ac
major open spaces & recreation
major institutional
county conservation/preservation
vacant/transitional
agricultural
industrial
commercial
CLINT MOORE RD.
441
808
CONSERVATION AREA 1 LEVEE
BROWARD COUNTY LINE

SOURCE: STOTTLER STAGG & ASSOCIATES ESTIMATES, JUNE 1979

SOUTHERN REGION PALM BEACH C

00 GENERALIZED LAND USE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EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
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PALMETTO PK. RD.
CAMINO REAL
POWERLINE
S.W 18th ST.
HILLSBORO CANAL
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ATLANTIC OCEAN
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CITY LIMITS
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fig

Table III-2
LAND USE PROXIMITY (1980)

	500 Ft.	1000 Ft.	2000 Ft.	3000 Ft.
RPS 1 (American Homes)	30	122	384	525
RPS 2 (Sandalfoot)	13	294	1527	3040
RPS 3 (Pheasant Walk)	12	49	101	191
WWTP (Glades Road)	--	--	123	632

Source: January 1979 Aerial Photography
SSA Windshield Survey, February 1980

The compatibility of the construction and operation of the facilities required by these alternatives is an important consideration. Site clearing, grading and excavation will generate nuisance conditions such as dust, noise and debris. However, these nuisances are temporary conditions and will be limited to the areas adjacent to the construction of the force mains. Since the regional pump stations and treatment plants are on existing sites, no significant site construction will be necessary.

The implementation of any of the alternatives will ultimately result in development reflecting the future land use shown in Figure III-3. Local land use policy indicates that this will be true even if the preferred alternative of no Federal action in the County portion of the Planning Area is implemented. This land use plan shows extensive increases in the amount of residential and commercial development in the area. The major adverse impact of this development will be the conversion of large tracts of unique agricultural land to this residential and associated development.

Three million acres of agricultural land are converted to urban uses each year. A continuation of this trend to the end of the century will seriously effect our traditional role as an exporter of food. Palm Beach County now has major acreage devoted to agricultural production. This County is now coming under increasing development pressure. The County's Comprehensive Plan recommends the protection of some of these areas. The South County area, however, is slated for development rather than protection.

Commmunity Services and Facilities

This section analyzes the existing community services and facilities in the Planning Area. Figure III-4 shows the location of these facilities.

There are three elementary schools, one middle school, and one high school located in the Planning Area. The three elementary schools contain 21.8, 14.7, and 13.8 students per instructional staff member respectively. The middle school and high school have 22.2 and 21.5 students per instructional staff member respectively. The high school began double sessions in the 1979-80 school year. Land has been dedicated for the construction of a new high school in Northwest Boca Raton.

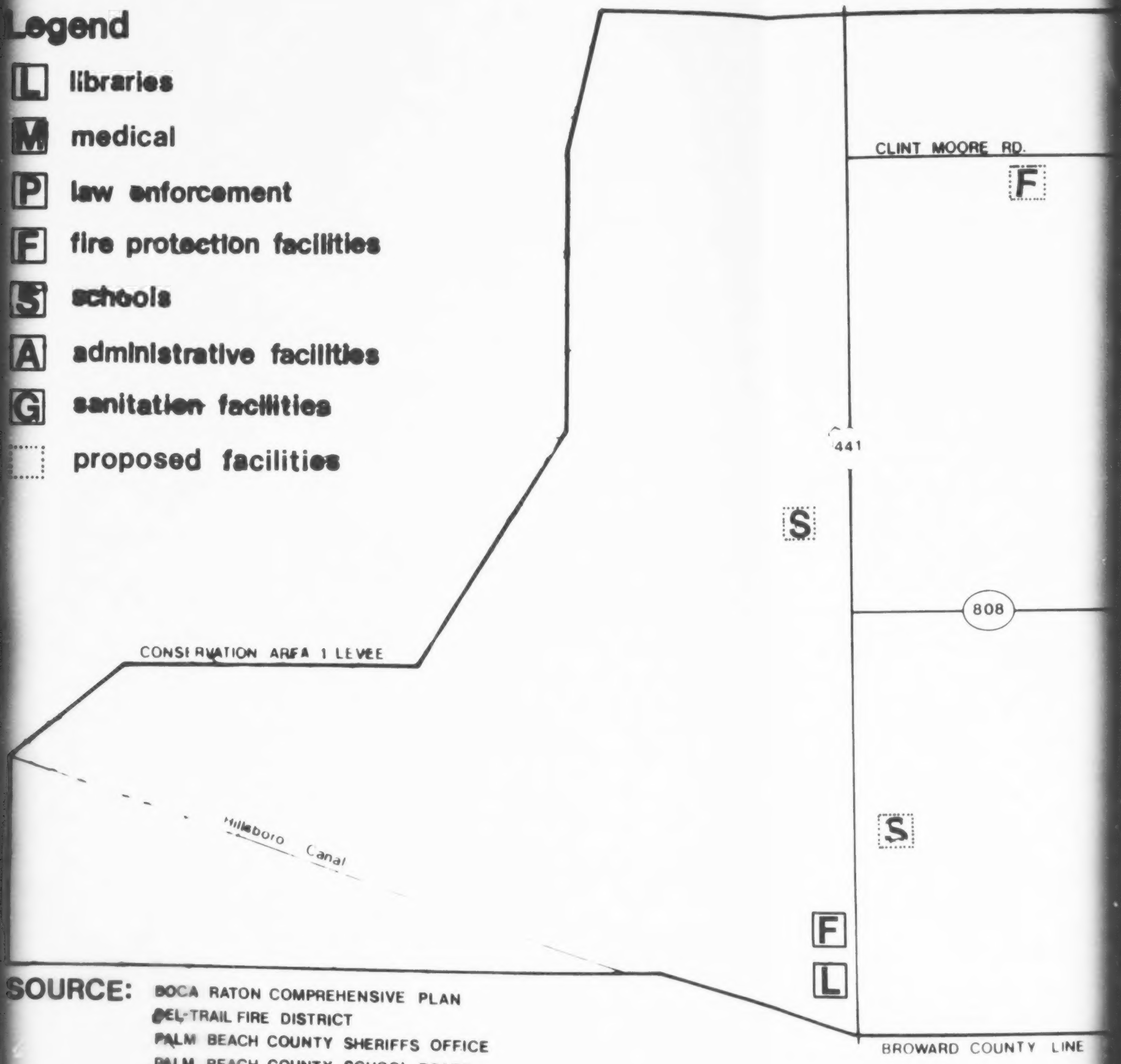
Law enforcement for the study area is provided by both the City of Boca Raton and the Palm Beach County Sheriff's Department. In 1980, the City and County both had 1.6 officers per thousand population. It is generally accepted that 2.0 officers per thousand population is a reasonable standard.

Fire protection for the incorporated area of Boca Raton is provided by the Boca Raton Fire Department, which operates out of four stations. It has an American Insurance Association fire rating of four. Fire protection for the unincorporated portion of the study area is provided by the independent Del-Trail Fire District. Funds for the District come from an ad valorem tax in the area. Three stations serve the area. The fire insurance rating for the district is nine. Fire insurance ratings are given on a scale of 1 to 10 with 1 being the best.

The Planning Area is served by two libraries. The Boca Raton Public Library is located at 200 N.W. Second Ave. and serves only the residents of the City. The Southwest Branch of the Palm Beach County Library System is located in Sandalfoot Cove Shopping Center.

Refuse waste collection and disposal is provided for residents within the corporate limits of Boca Raton by the City of Boca Raton. Residents in the unincorporated area are served by a private contractor. The City provides twice-a-week backyard collection service for garbage and bi-monthly service for yard trash. The City disposes of approximately 40,000 tons of refuse annually.

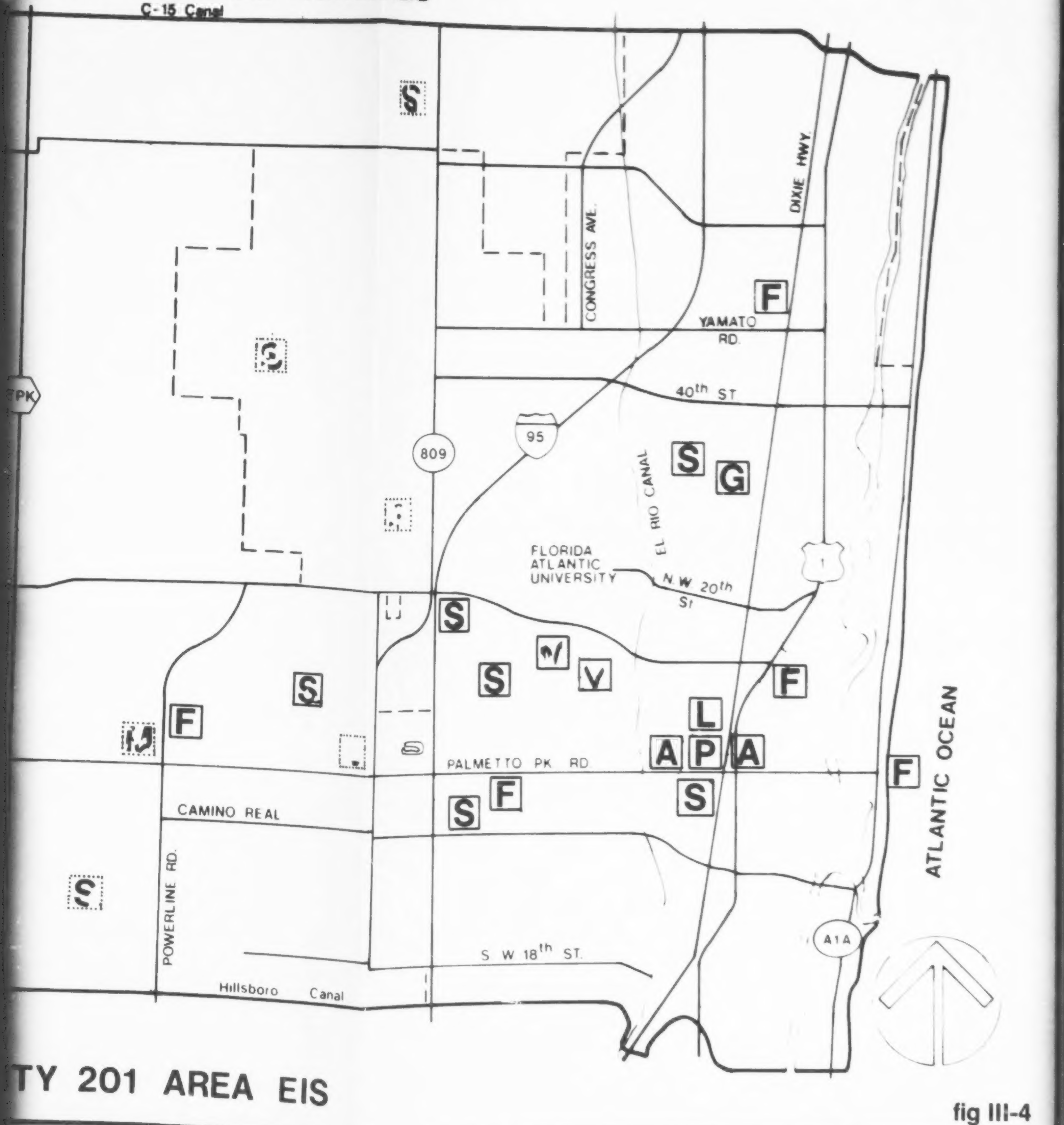
COMM


Legend
L libraries
M medical
P law enforcement
F fire protection facilities
S schools
A administrative facilities
G sanitation facilities
proposed facilities
CLINT MOORE RD.
F
441
S
808
CONSERVATION AREA 1 LEVEE
Hillsboro Canal
S
F
L
BROWARD COUNTY LINE

SOURCE: BOCA RATON COMPREHENSIVE PLAN
DEL-TRAIL FIRE DISTRICT
PALM BEACH COUNTY SHERIFFS OFFICE
PALM BEACH COUNTY SCHOOL BOARD

SOUTHERN REGION PALM BEACH C

UNITY SERVICE FACILITIES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POWERLINE RD.
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S W 18th ST.
Hillsboro Canal

TY 201 AREA EIS

fig III-4

Currently, the City does not operate any solid waste disposal facilities but hauls its solid waste to the Lantana landfill and a disposal site near Pompano Beach. Both disposal sites are located outside of the Planning Area. Maintenance facilities for the City's sanitation service are located at Northwest First Avenue and Northwest 25th Street. The City has a total sanitation workforce of 70.

The Palm Beach County Solid Waste Authority was established to plan for development and management of solid wastes in the County. The Plan, adopted in 1979, established a policy of accepting municipal sludge, but will not accept septic tank sludge. A new disposal site between the Turnpike and U.S. 441 north of the Planning Area is being considered. However, no firm plans have been made at this time.

There are no public health or welfare facilities located in the Planning Area. Palm Beach County operates a health facility and welfare facility in Delray Beach and residents of the study area are serviced by these facilities. Boca Raton Community Hospital is a non-profit hospital located at 800 Meadows Road in Boca Raton. Boca Raton Community Hospital is a fully accredited hospital providing inpatient, outpatient and ancillary services.

Municipal administrative facilities for the City of Boca Raton are currently decentralized, with administrative centers located primarily at City Hall, the City Hall Annex, Haggerty Building, Garage Complex and the Fischer Building. These facilities house general administrative-type functions such as personnel, community development, and public works.

County administrative facilities are located outside the Planning Area. There is a south county courthouse annex located in Delray Beach, which houses general administrative-type functions such as building permits, welfare services, housing assistance, health department functions, court services, and licensing services.

The rate of population growth which is projected for the Planning Area will cause a tremendous increase in the demand for community services and facilities. Table III-3 shows the increases in these services and facilities which would be required to keep pace with current capacities per resident. A very significant investment of financial resources would be required to even come close to meeting these needs. The most severe problems in meeting demand will be in the transportation and education systems. If these needs are not met, the overcrowding problems which are now evident will become significantly worse.

Existing land use policy and market conditions in the Planning Area indicate that these population figures will be met no matter which alternative is selected. The County appears willing to provide the wastewater facilities to support this level of growth with 100% local funding if necessary. This policy decision will require extensive public investments in facilities and services in this Planning Area.

Taxes and Budgeting

Table III-4 shows the charges for water and sewer services for the City of Boca Raton system, the Pheasant Walk system and the South Palm Beach Utilities Company (SPBUC) system. For comparative purposes, only the residential rates are shown.

A two-bedroom dwelling unit that uses 10,000 gallons of water in a month will be charged $27.55 in the Pheasant Walk system, $28.34 in the SPBUC system and $9.88 in the Boca Raton system.

Two general purpose governments exist within the Planning Area; the City of Boca Raton and Palm Beach County. Additionally, the study area is serviced by the South Florida Water Management District, the Palm Beach County Library District, the Del Trail Fire Control District and the Lake Worth Drainage District. Other jurisdictions in the Planning Area are the Boca Del Mar II New Community District, the Greater Boca Raton Beach Taxing District and the Palm Beach Solid Waste Disposal Authority. Table III-5 shows these units of government and their FY 1977-78 millage rates. Table III-6 shows the units of government and their expenditures per community service. Table III-7 shows governmental revenues for Boca Raton and Palm Beach County.

Table III- 3

Summary of Selected Impacts

	1980	2000
Average Daily Trips	181,244	728,912
Neighborhood Parks (acres)	36	210
Community Parks (acres)	250	699
Metropolitan Parks (acres)	196	1,395
Regional Parks (acres)	287	1,953
Elementary Schools	4	18
Middle Schools	1	5
Senior Schools	1	4
Hospital Beds	1,047	1,030
Electricity Consumption (KWH Millions Annually)	293	991
Solid Waste (tons/yr)	53,100	221,950
Law Enforcement Officers	134	515
Firemen	144	487
Library-volumes	66,000	257,566
Library-space	11,792	154,540

Source: Baseline Report, January 1980
PBC Planning, Building and Zoning Dept. April 1979

TABLE III-4

RESIDENTIAL WATER AND SEWER RATES

Boca Raton

Water and Sewer Monthly Rates:

Basic Charge (water)	$ 2.03
Each Thousand Gallons	0.44
First Bathroom (sewer)	2.30
Each Additional Bathroom	1.15

South Palm Beach Utilities Company

Water Monthly Rate:

First 3,000 Gallons	$ 7.20
Each Thousand over first 3,000	1.32
Sewer Monthly Rate	11.90

Pheasant Walk

Water and Sewer Monthly Rates:

First 4,000 Gallons	$ 15.75
Each Thousand over first 4,000 up to 10,000	2.00
Each Thousand over first 10,000	1.30

Sources: Palm Beach County Utilities Department, June 1979.
South Palm Beach Utilities Company, May 1979.
Boca Raton Billing Method Public Information Handout, May 1979.

TABLE III-5

GOVERNMENTAL UNITS - MILLAGE RATES

General Purpose	Millage Rate
Palm Beach County	5.981
Boca Raton	6.107
Independent Special Districts	
Regional:	
South Florida Water Management District	0.375
Treasure Coast Regional Planning Council	0.000
Local:	
Greater Boca Raton Beach Taxing District	1.374
Lake Worth Drainage District	special assessment
Palm Beach Solid Waste Authority	0.000
Boca Del Mar II New Community District	0.000
Palm Beach Soil and Water Conservation District	0.000
Palm Beach County School Board	8.300
Dependent Special Districts	
Del Trail Fire Control District	1.700
Library District	0.370
Municipal Taxing District	0.000

Source: Local Government Financial Report, FY 1977-78, State of Florida, Department of Banking & Financing.

TABLE III-6
PUBLIC SERVICE EXPENDITURES

Public Service	Total Expenditures	Study Area Expenditures	$ per Capita	Total % of Budget
Transportation:				
Boca Raton - Streets & Roads	955,815	955,815	16.39	6.5
Palm Beach County - Streets & Roads	8,620,129	1,070,999	60.05	4.0(2)
Palm Beach County - Transit Systems	3,561,056	442,211(3)	6.86	
Airport	-0-	-0-	N/Ap	N/Ap
Public Safety:				
Boca Raton - Police	3,233,950	3,233,950	55.45(2)	13.6
Palm Beach County - Sheriff	14,518,456	484,399	27.16	7.8
Boca Raton - Fire	1,849,412	1,849,412	31.71(2)	10.9
Del Trail Fire District(3)	1,216,200	361,515	20.27	3.3(4)
Sanitation:				
Boca Raton	2,100,170	2,100,170	36.01	8.9
Palm Beach County	1,401,386	173,963	9.75	1.1
Libraries:				
Boca Raton	209,836	209,836	3.60	0.9
Palm Beach County	1,691,189	93,990	5.27	0.9
Parks & Recreation:				
Boca Raton	579,124	579,124	9.93	2.4
Palm Beach County	4,082,785	507,281	28.44	3.9
Beach Taxing District(5)	1,664,976	1,644,976(3)	25.83	100.0

Continued Next Page

TABLE III-6 (continued)
PUBLIC SERVICE EXPENDITURES

Public Service	Total Expenditures	Study Area Expenditures	$ per Capita	Total % of Budget
Health and Welfare:				
Boca Raton	-0-	-0-	N/Ap	0.0
Palm Beach County	17,328,786	2,152,623	120.70	5.2
Schools:				
Palm Beach County	128,131,504	N/Av	1,734.65(6)	N/Av

(1) Private contractor leases from F.A.U.

(2) Based on Boca Raton Population - 58,318; (1980)
Palm Beach County Study Area Population - 17,835.

(3) Based on population of 64,459

(4) County aggregates several districts in budget.

(5) Area East of Turnpike.

(6) Countywide Average.

Sources: Local Government Finance Report, FY 1977-1978, State of Florida, Department of Banking and Finance.

Stottler Stagg & Associates, Estimates, July 1979.

The Annual Report of the Commissioner of Education, 1977-78, Florida Department of Education.

TABLE III-7
GOVERNMENTAL REVENUES
1977-78

	PALM BEACH COUNTY Dollars	%	BOCA RATON Dollars	%
TAXES		39.9%		43.9%
Property taxes	$ 49,665,833		7,663,609	
Franchise taxes	500		1,140,838	
Utility service taxes	-0-		2,114,046	
LICENSES & PERMITS		0.1%		3.7%
Professional/occupational	47,456		116,955	
Building permits	-0-		726,139	
Others	41,466		19,385	
INTERGOVERNMENTAL REVENUE		40.2%		18.8%
Federal grants	35,184,827		303,811	
Federal shared revenue	3,006,094		356,412	
Federal payments in lieu	18,360		-0-	
State grants	2,364,041		266,499	
State shared revenue	9,107,226		1,747,729	
Local grants	296,379		1,373,496	
Local shared revenue	-0-		651,107	
CHARGES FOR SERVICES		14.0%		21.7%
General government	4,454,931		26,671	
Public safety	1,123,964		62,736	
Physical environment	4,998,606		5,061,349	
Transportation	5,057,645		-0-	
Human services	1,048,018		631	
Culture & recreation	277,316		213,414	
Other	341,926		85,322	
FINES & FORFEITURES	277,016	0.3%	213,414	0.8%
MISCELLANEOUS REVENUE		5.0%		11.2%
Interest earnings	2,928,664		1,057,505	
Rents & royalties	106,308		-0-	
Special assessments	251,313		-0-	
Compensation for losses	595,925		-0-	
Contributions & donations	2,007,200		1,656,461	
Other	357,194		113,989	
TOTAL REVENUES	124,597,828		24,991,798	

Sources: *Local Government Finance Report, FY 1977-78*, State of Florida, Department of Banking and Finance.
Stottler Stagg & Associates, Estimates, July 1979
The Annual Report of the Commissioner of Education, 1977-78, Florida Department of Education.

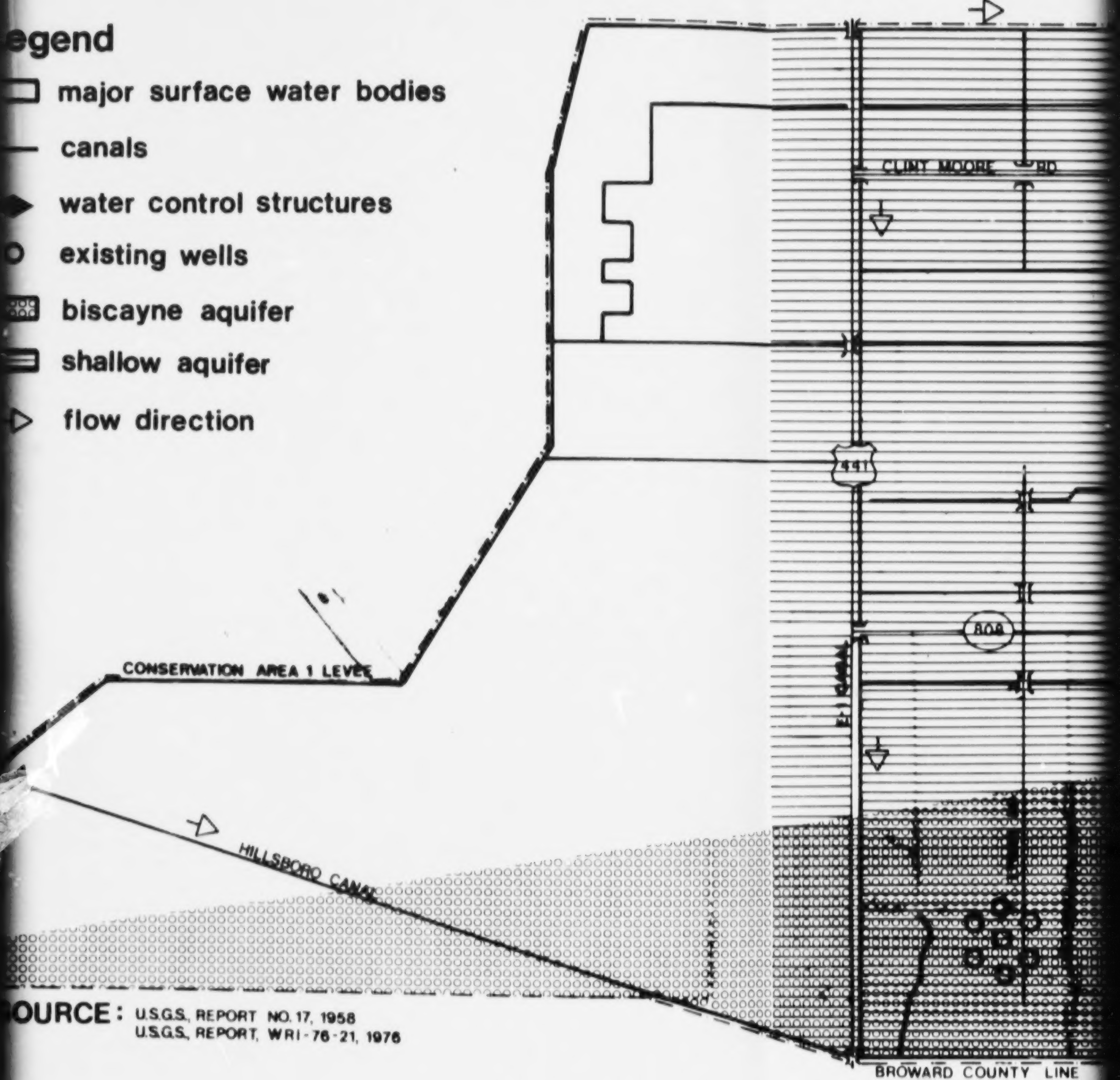
The extensive increases in community services and facilities required to avoid extremely overcrowded conditions will require the expenditure of significant amounts of public funds. These expenditures will probably require increased taxes, even though the tax base will be expanding. The location and rate of development within the unincorporated area is now being controlled by market forces rather than a financially viable public improvements planning program. Similar high growth areas throughout the country have historically been forced to significantly increase taxes if they wished to keep pace with the increased demand on their services and facilities.

Water Quality and Quanitity

The majority of the area drains into the Hillsboro Canal which has an average flow of 212 MGD. The northeastern portion of the Planning Area drains into the C-15 Canal. Both canals discharge into the Intracoastal Waterway. A comprehensive system of lateral canals was established by the Lake Worth Drainage district for irrigation and flood control purposes. The major north-south canals connect the laterals to the Hillsboro and C-15 Canals. All of the canals are hydrologically linked to the groundwater supplies and are designated as Class III waters. The location of these canals is shown in Figure III-5.

Figure III-5 also shows the general location of the Biscayne and Turnpike (shallow) Aquifers. Although the evidence is not yet conclusive, it is generally thought that the Biscayne and Turnpike Aquifers are interconnected. This situation may be disproven by the results of a more thorough study currently being conducted by the USGS.

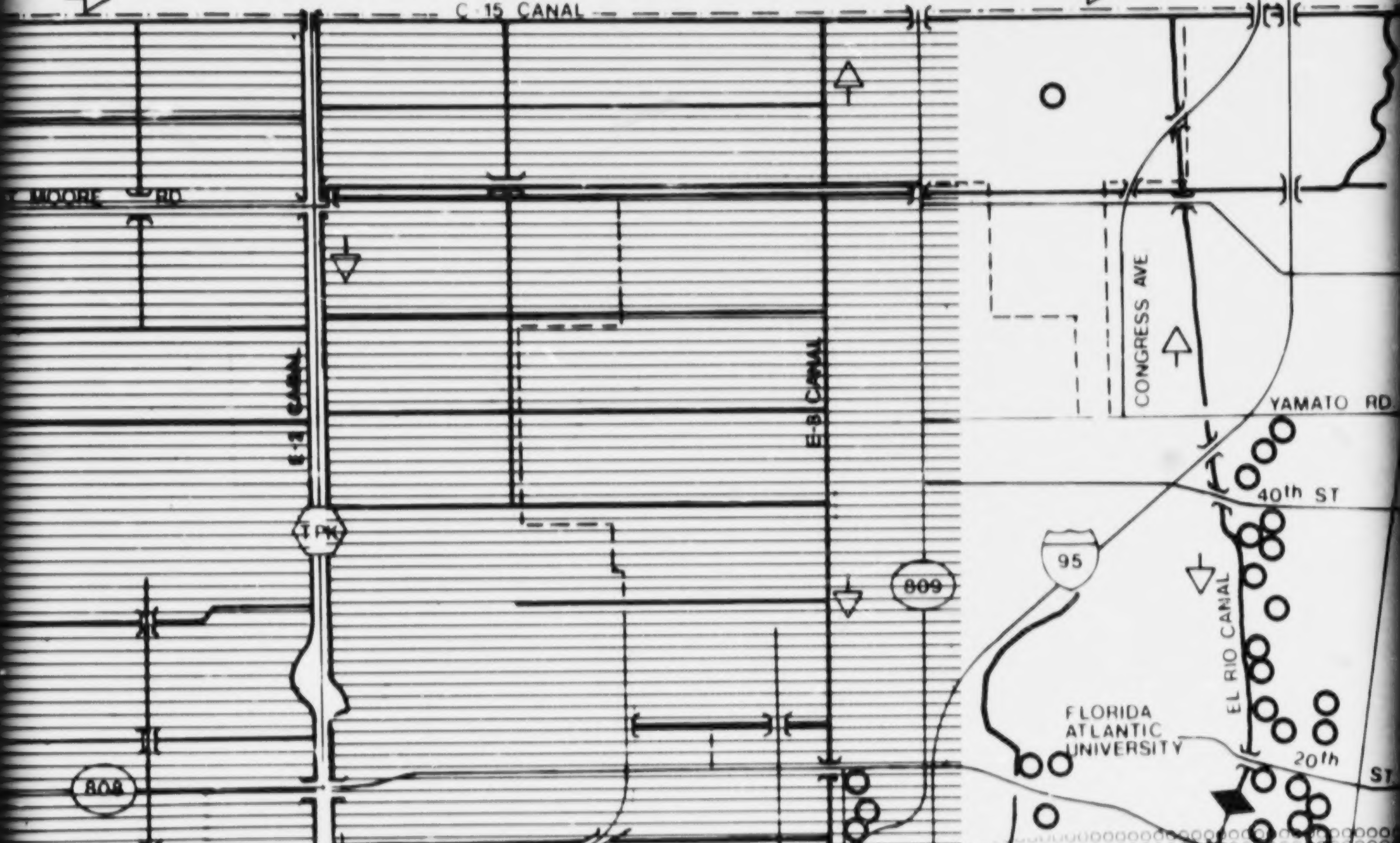
A study published in February 1976 stated that the Turnpike Aquifer supplies more than 90 percent of the potable water used in the eastern half of the County. The Aquifer ranges in depth from 125 feet below sea level near the Conservation Area to 250 feet below sea level along the coast. It is primarily recharged by local rainfall. The concentration of dissolved solids is generally less than the 500 mg/l State standard for drinking water. The bottom of the Aquifer ranges from 225 feet below sea level near the Conservation Area to 400 feet below sea level near the coast. The bottom of the Aquifer is formed by an impervious formation of green clay approximately 1500 feet thick. Below this formation is the highly salted Floridan Aquifer.


egend
major surface water bodies
canals
water control structures
existing wells
biscayne aquifer
shallow aquifer
flow direction
CLINT MOORE RD
441
808
E-1 CANAL
CONSERVATION AREA 1 LEVEE
HILLSBORO CANAL
BROWARD COUNTY LINE

OURCE: U.S.G.S., REPORT NO. 17, 1958
U.S.G.S., REPORT, WRI-76-21, 1976

SOUTHERN REGION PALM BEACH CO

WATER RESOURCES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YAMATO RD
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EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
20th ST
PALMETTO PK. RD
S. W. 18th ST
HILLSBORO CANAL
WARD COUNTY LINE
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

BEACH COUNTY 201 AREA EIS

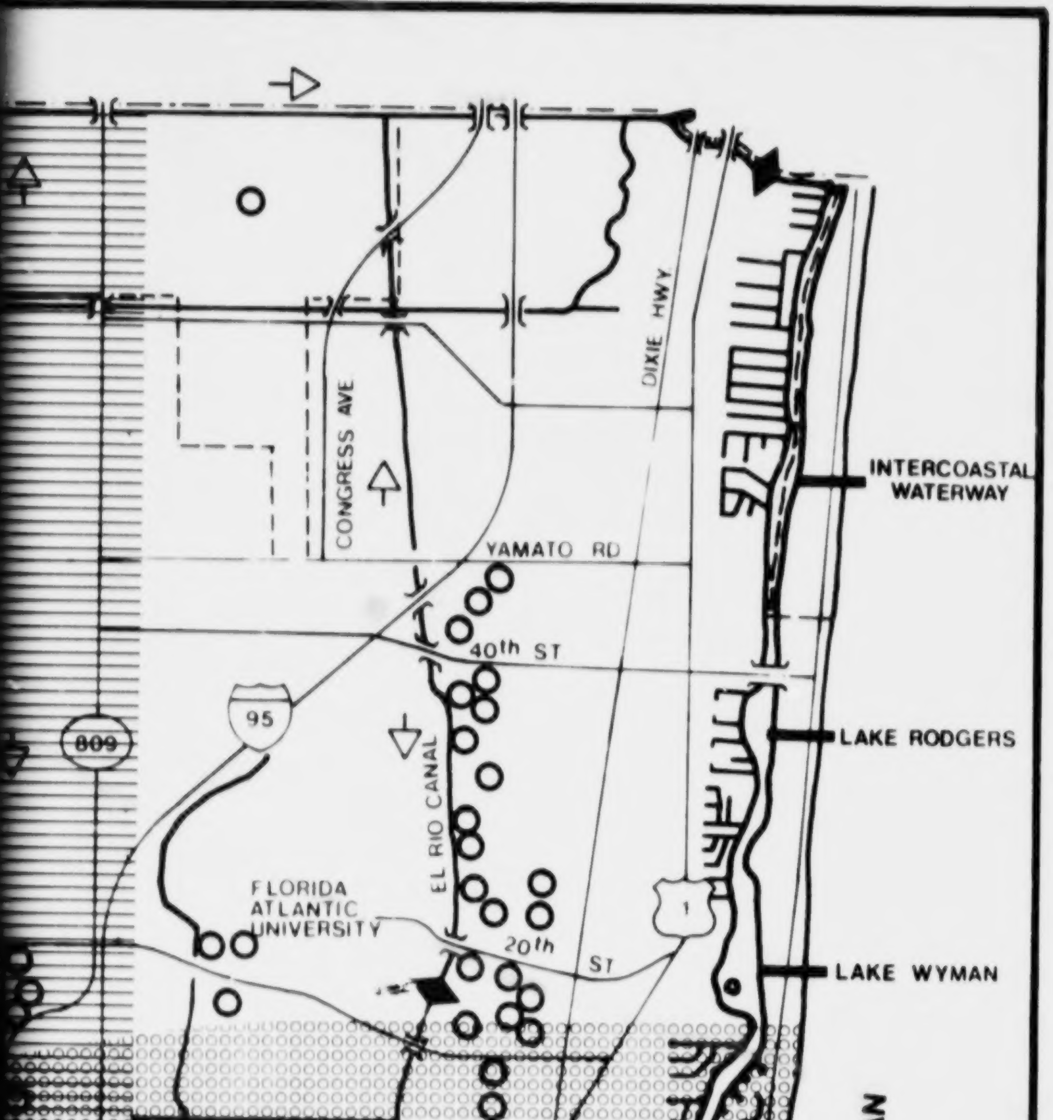

INTERCOASTAL WATERWAY
CONGRESS AVE
DIXIE HWY
YAMATO RD
40th ST
95
809
EL RIO CANAL
LAKE RODGERS
FLORIDA ATLANTIC UNIVERSITY
1
20th ST
LAKE WYMAN
ATLANTIC OCEAN
PALMETTO PK. RD.
LAKE BOCA RATON
BOCA RATON INLET
A1A
S. W. 18th ST
LEGEND
ROADS
CANALS
CITY LIMITS
STUDY AREA BNDY.

fig III-5

The EPA recently designated the Biscayne Aquifer and its tributaries as a "sole source aquifer" under provisions of the Safe Drinking Water Act. This designation means that all federally funded programs will be carefully examined to protect against possible contamination of this resource. The administrative rules to implement this designation are currently under preparation.

Control structures near the Intracoastal Waterway are used to regulate the release of canal water from the major canals during the dry season and to maintain the aquifer at the levels required to prevent saltwater intrusion. Consequently, during the dry season, zero flow is frequently recorded in many of the canals. These structures also function as flood control devices during wet conditions.

The mean discharge recorded in the Hillsboro Canal near Deerfield Beach is 332 cfs, based on 35 years of record. A flow of 3700 cfs in April 1979 and a minimum flow of 0.0 cfs was recorded for several days in 1939, 1940 and again in 1959. These flows, however, represent regulated, managed flows.

Flows in the other canals in the system are smaller than the Hillsboro Canal and their water levels and flows also reflect the water management operations as controlled by numerous control structures and pumping within the drainage district. Flow in these canals is minimal during the dry season. The seven-day, ten-year low flow (7/Q/10) for these canals is 0.0 cfs.

Water quality data for the canals indicate only marginal quality. Violations of the State water quality criteria are common as is the occurrence of nuisance aquatic plant growth.

The Hillsboro and C-15 Canals frequently violate the dissolved oxygen (D.O.) minimum criterion of 4 mg/l. In the Hillsboro Canal, violations of the D.O. standard occur more frequently during the wet season than in the dry season. This situation is a common occurrence in South Florida canals and is generally thought to be due more to groundwater influences.

While there were no firm numerical criteria established for nutrients, guidelines were suggested in the 208 Plan for nitrogen and phosphorus forms which are considered to be adequate for the control of nuisance growth. The Hillsboro Canal exceeds the recommended nutrient levels in both wet and dry seasons. Measurements taken at the Deerfield Lock showed a mean nitrogen concentration of 1.22 mg/l and a mean phosphorus concentration of 0.10 mg/l. These measurements compare to the 208 recommended guidelines of 1.0 mg/l of nitrogen and 0.07 mg/l of phosphorus (208 Plan, pg. 3.6-134).

Nutrient data for the urbanized areas of the Hillsboro Canal Basin show a steady increase in average concentration over time. The less urbanized areas show high, but relatively stable nutrient concentrations. Heavy metals and pesticides have been detected but are generally well below recommended levels for the major canals.

The quality of the secondary canals is of particular interest due to the proximity of municipal well fields. The City's two well fields are located in proximity to the E-3 and El Rio Canals. The wells are located near the canals since the canal system itself is the primary source of recharge during the dry season. Figure III-5 shows the approximate locations of these wells.

Since these canals are the immediate recharge of the drinking water aquifer, heavy metals and pesticides are also monitored by the U.S.G.S. On October 20, 1977, U.S.G.S. conducted a chemical analysis of water samples taken from the E-2 and E-3 Canals. The results of the analysis exceeded the water quality criteria for Class III waters. However, compared with the 1972 EPA raw drinking water quality recommendations, the following pollutants exceeded the recommended levels: detergents; toxaphene; 2,4-D; dieldrin; phenoloc compounds and silvex.

Chemical analysis of raw water samples taken from two city test wells showed the same increasing trend for total lead even though concentrations were still below the allowable limits. Again, comparing the results with the EPA raw drinking water criteria, the following constituents were found to equal or exceed the recommended levels: iron, silvex and phenols. In addition, trace amounts of mercury and 2,4-D were detected.

Pesticides and herbicides are contributed through both urban and rural runoff. In addition, the use of herbicides to control aquatic weed growth is an additional source of these toxics. While the concentrations for most toxics do not exceed the recommended levels, a large variety has been detected in the surface waters, including some 16 pesticides, 2 herbicides, PCBs and mercury.

In 1972, EPA published a report which evaluated several alternative wastewater disposal methods in South Florida. Among the alternatives evaluated was disposal by outfall. This study found that this technique was a viable method of disposal provided that:

1. The outfall alignment minimized disturbance to the reefs.
2. The outfall extends beyond the third reef or at the 90 feet below sea level mark.
3. The effluent receives secondary treatment. Secondary treatment was defined as 100% removal of floatable and settleable solids; 90% removal of suspended solids; 90% removal of the BODs; and, chlorination of the effluent.

The City of Boca Raton prepares quarterly reports that monitor the effluent at the outfall. The City also makes visual inspection of the discharge area of the outfall on an annual basis. DER also requires monthly operating reports of the effluent at the plant. In addition, the Palm Beach County Health Department quarterly samples bacteriological conditions along the public beaches. None of these monitoring efforts have determined any adverse impacts from the outfall.

No adverse point source impacts to surface water quality will be caused by the implementation of any of the alternatives. The preferred alternative provides for continued discharge by the ocean outfall. As discussed above, no adverse impacts have been identified related to the operation of the ocean outfall. No discharges to surface waters other than the ocean are proposed in any of the alternatives.

An increase in non-point source runoff to surface waters will probably result from the increased population which will occur whichever alternative is implemented. The character of the runoff will change in the unincorporated area from being agricultural in nature to urban with more heavy metals resulting from the extended transportation system and a higher overall total runoff resulting from the increase in impervious surfaces.

Alternatives 2, 5 and 9 include discharge of treated wastewater by spray irrigation. This is a well proven technique with limited adverse impacts to groundwater anticipated. Alternative 8, the preferred alternative, involves the continued use of percolation ponds for discharge. Existing monitoring records indicate that no problems currently exist. A continued monitoring program will be in place to insure that no excessive nitrate build-up occurs in the future. Alternative 4 involves the use of deep well injection as a disposal technique. A test well would have to be tried before this alternative could be implemented.

The alternatives involving the use of the ocean outfall will dispose of up to 29 MGD of treated wastewater into the ocean. Alternatives 2, 4, 5, 8, and 9 involve some form of recycling of treated wastewater. Because of high land costs, all of these alternatives except for the continued use of the existing percolation ponds are not cost effective at this time. In the long term however, water supply problems may cause the re-evaluation of these alternatives in the entire southeast Florida area.

Potable Water

The City obtains its water from two wellfields. The east wellfield includes 25 wells, spaced from south to north along Northwest 2nd Avenue and El Rio Canal. Most of these wells have pumps rated at 1 MGD each (Wells 1 to 23). Wells 24 and 25 have pumps rated at 2 MGD each. Thus, the total capacity of the east wellfield is theoretically 27 MGD. Normally, the production is limited to 17 MGD, of which not more than 3 MGD is pumped from Wells 1 to 9, because of the potential for saltwater intrusion into this area.

The west wellfield included 10 wells, as of October 1978, each having a pump rated at 2 MGD, making the total capacity of 20 MGD. Wells 1 to 9 are spaced from north to south along the E-3 Canal, to the south of Glades Road. Well 10 is located at the Glades Road Water Plant. Two new wells, Nos. 11 and 12, are being constructed in the vicinity of the water treatment plant, each rated at 2 MGD. When the new wells are in operation, the total capacity of the west wellfield will theoretically be 24 MGD. However, normal production is expected to be limited by plant capacity to 20 MGD.

Accordingly, the combined capacity of the City's east and west wellfields at the beginning of 1979 was considered to be 37 MGD at the east wellfield and 20 MGD at the west wellfield. However, the existing treatment capacity of both plants is 33 MGD. The City's system serves virtually all of Boca Raton and a limited portion of the Reserve Area.

The South Palm Beach Utilities Company (SPBUC) serves all of the residences west of the Turnpike that are on a central system. The SPBUC estimates that there were 7,200 connections as of March 1979. The capacity of the system is 6.5 MGD. The existing flows in the area are 2.3 MGD. SPBUC's wellfields are in the Sandalfoot Golf Course.

The County operates a water and sewer system in the Pheasant Walk area. There are three wells tied to a reverse osmosis treatment plant with a capacity of 0.35 MGD. The plant is presently expanding to 1.08 MGD. Well No. 1 is a 100' deep, 6" well producing 0.24 MGD; well No. 2 is a 80' deep, 6" well producing 0.24 MGD and well No. 3 is a 10" well, 120' deep producing 0.48 MGD.

The increase in population expected in the Planning Area will cause a substantial increase in the demand for potable water. Future potable water needs in five year increments until the year 2000 are shown in Table III-8. All of these needs can be met by existing and proposed wellfields in the Planning Area to the year 2000.

Alternatives 2, 5, and 9 would decrease demand for potable water to some degree through the implementation of spray irrigation systems. These same alternatives, with the addition of alternatives 4 and 8, provide some degree of recycling. Alternatives 8 and 10 will not provide Federal funding to service this expanded demand.

TABLE III-8
PROJECTED WATER DEMAND
(MGD)

Year	Demand	East of Turnpike	West of Turnpike	Total Study Area
1980	Average Daily Demand	17.9	2.3	20.2
1980	Maximum Daily Demand	29.5	3.8	33.3
1980	Production Required	33.0	4.2	37.2
1985	Average Daily Demand	26.4	4.1	30.5
1985	Maximum Daily Demand	43.6	6.8	50.4
1985	Production Required	48.8	7.6	56.5
1990	Average Daily Demand	37.9	7.8	45.7
1990	Maximum Daily Demand	62.5	12.9	75.4
1990	Production Required	70.0	14.4	84.4
1995	Average Daily Demand	45.9	10.9	56.8
1995	Maximum Daily Demand	75.7	18.0	93.0
1995	Production Required	84.8	20.2	105.0
2000	Average Daily Demand	54.4	13.6	68.0
2000	Maximum Daily Demand	89.8	22.4	112.2
2000	Production Required	100.6	25.1	125.7

Source: Baseline Environment Report, Jaunary 1980

Cultural Resources

The Spanish explorers probably stayed in the Boca Raton area as early as the late 1500s. For the next two or three centuries, pirates used Lake Boca Raton as a camp or hiding place during their escapades in the area. The Seminole Indians settled in the area in the early 1800's, and the first permanent resident was probably Joshua Bowen, in the late 1870's.

The Boca Raton area did not develop until Henry Flagler extended the railroad (now known as the Florida East Coast Railroad) to Miami in the late 1890's. Around the turn of the century, T.M. Richards began selling land for growing pineapples. The area prospered as a winter vegetable region through the early 1900's.

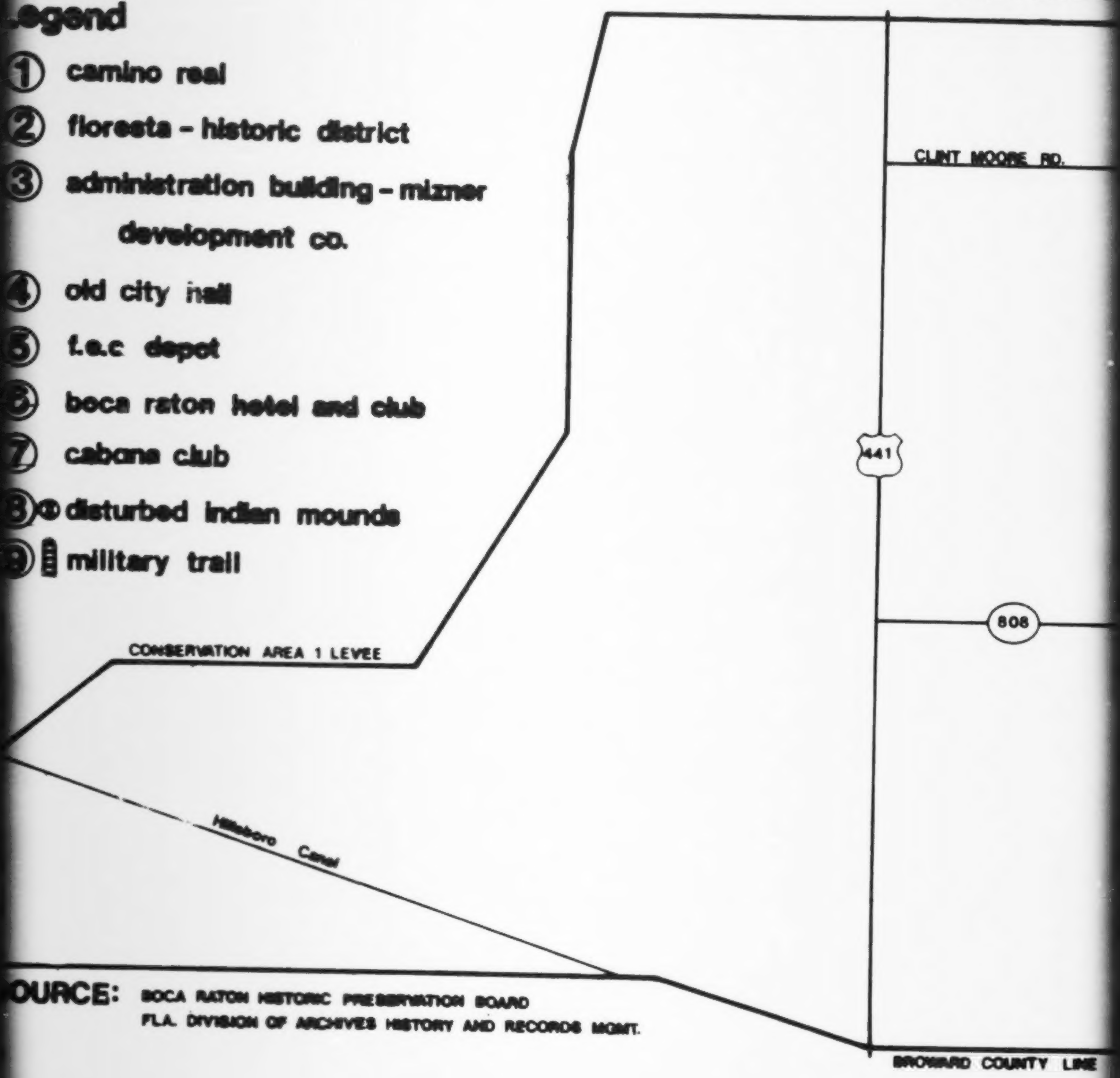
The Florida Division of Archives, History and Records Management indicates that the last two surveys conducted in the area were completed in 1955 and 1980 with the cooperation of the Historical Preservation Board of Boca Raton. Both surveys concentrated in the eastern portion of the Planning Area. The known archeological and historical sites in the area are shown on Figure III-6.

All of the archeological sites listed have been excavated or disturbed. The Barnhill Mound site at U.S. 1 and Yamato Road is included within the site of a proposed subdivision. Since the western area has been disturbed by agricultural operations, it is doubtful that any historical or archeological sites of significance remain.

There are no definite local government programs or regulations to protect historical or archeological resources. However, both the City and County are in the process of developing such programs. A proposal to designate Floresta as a historic district is under consideration by the City.

Construction activities associated with wastewater treatment facilities and with projected growth and development may destroy historical and archaeological resources unless appropriate precautions are taken. Any direct impacts from the construction of facilities associated with any of these alternatives should be minimal. Almost all of the construction proposed will be on already disturbed rights-of-way.

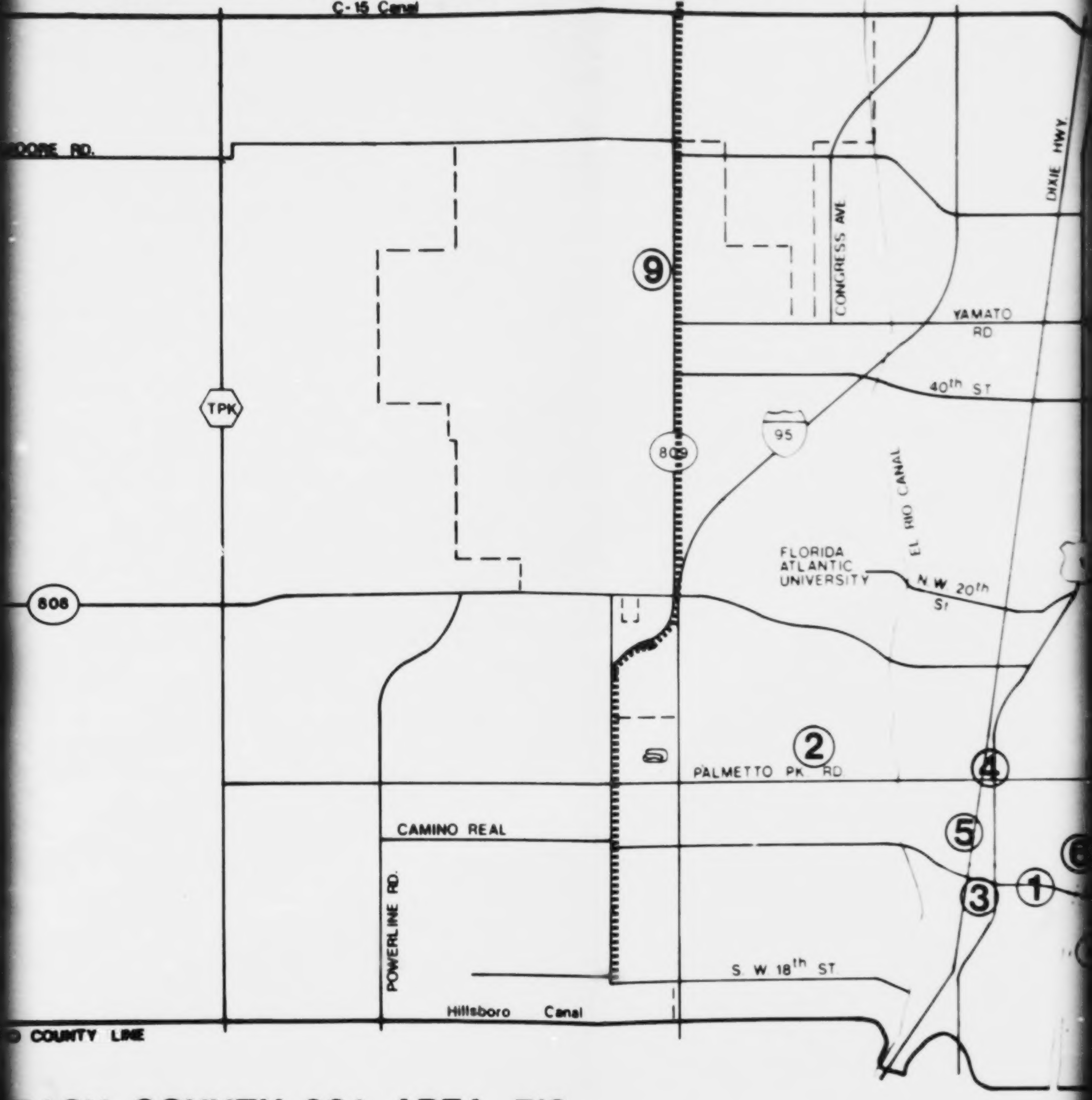
HISTORIC


egend
① camino real
② floresta - historic district
③ administration building - mizner development co.
④ old city hall
⑤ f.e.c depot
⑥ boca raton hotel and club
⑦ cabana club
⑧ ⊕ disturbed indian mounds
⑨ military trail
CLINT MOORE RD.
441
808
CONSERVATION AREA 1 LEVEE
Hillsboro Canal
BROWARD COUNTY LINE

OURCE: BOCA RATON HISTORIC PRESERVATION BOARD
FLA. DIVISION OF ARCHIVES HISTORY AND RECORDS MGMT.

SOUTHERN REGION PALM BEACH C

STORICAL AND ARCHEOLOGICAL RESOURCES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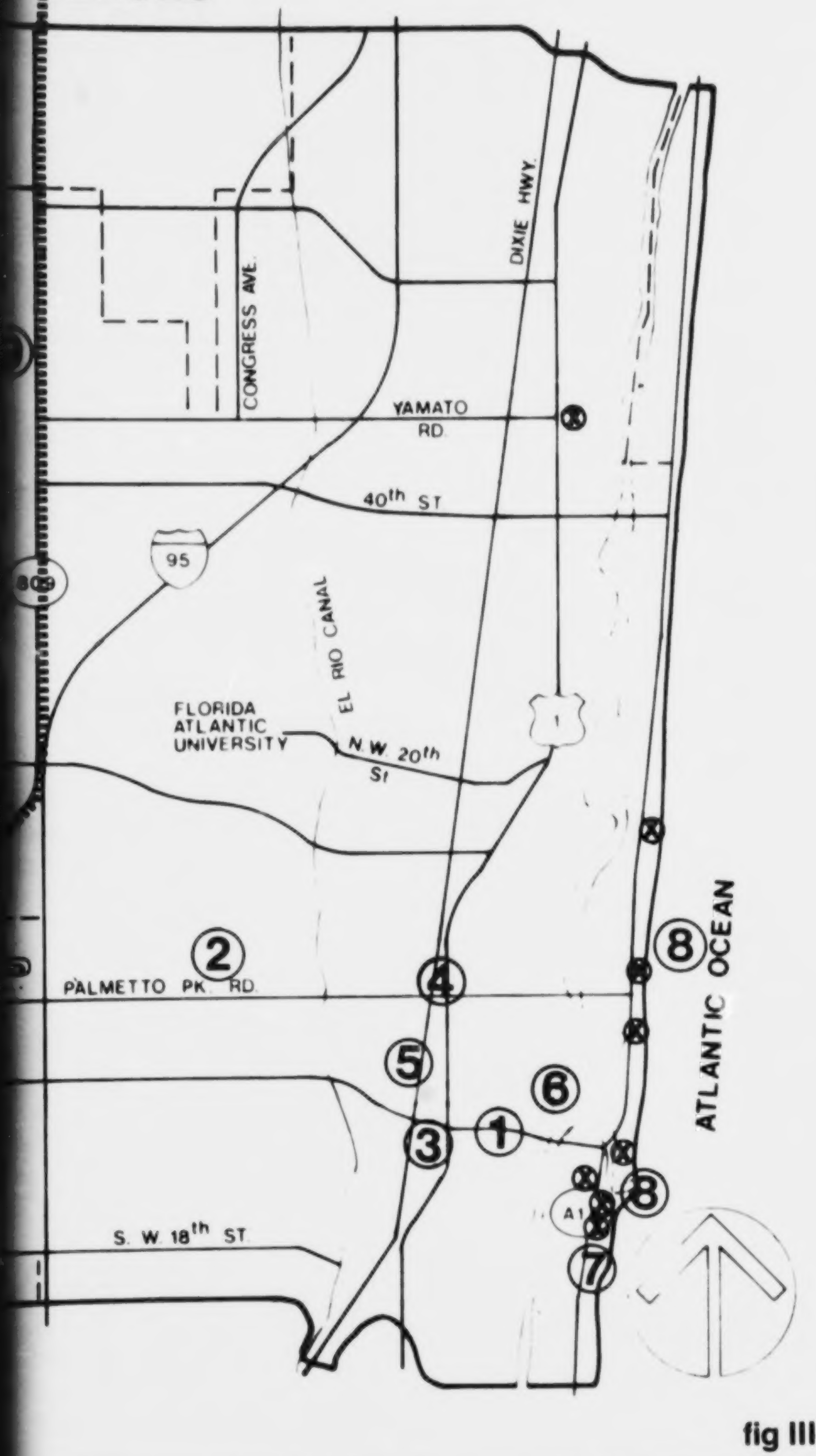
TPK
9
CONGRESS AVE
DIXIE HWY.
YAMATO RD
40th ST
95
809
EL RIO CANAL
FLORIDA ATLANTIC UNIVERSITY
N.W. 20th St
808
2
PALMETTO PK. RD
4
5
CAMINO REAL
6
1
3
POWERLINE RD.
S. W. 18th ST.
Hillsboro Canal
COUNTY LINE

EACH COUNTY 201 AREA EIS

SOURCES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PALMETTO PK. RD.
4
5
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1
3
8
8
A1
7
S. W. 18th ST.
ATLANTIC OCEAN

fig III-6

Recreational Resources

The major existing and proposed outdoor recreation facilities are shown in Figure III-7 and listed in Table III-9. Indoor recreation is provided at the Boca Raton Community Center, the Community Center/Clubhouses in most of the large land development projects, and at many of the schools.

An analysis of the planned unit development (PUD) throughout the Planning Area shows that an abundance of both indoor and outdoor recreation opportunities have been supplied by the private sector. These developments typically provide one or more golf courses, tennis courts, swimming pools, bicycle paths, and a wide variety of indoor facilities.

Both the City and the County require open space to be provided within PUDs. These requirements are 40 percent and 35 percent, respectively. Subdivisions are also required to provide recreational facilities. It is difficult to determine the exact amount of recreational facilities that have been provided through these mechanisms because not all open space is usable for recreation.

The large projected increase in population will require additional recreational facilities to avoid overcrowding of existing facilities as shown in Table III-3. The impacts to these facilities will not be as severe as to others such as schools and transportation since the existing recreational facilities are largely adequate. Also, open space is being provided in the new PUD developments in the Planning Area.

Transportation

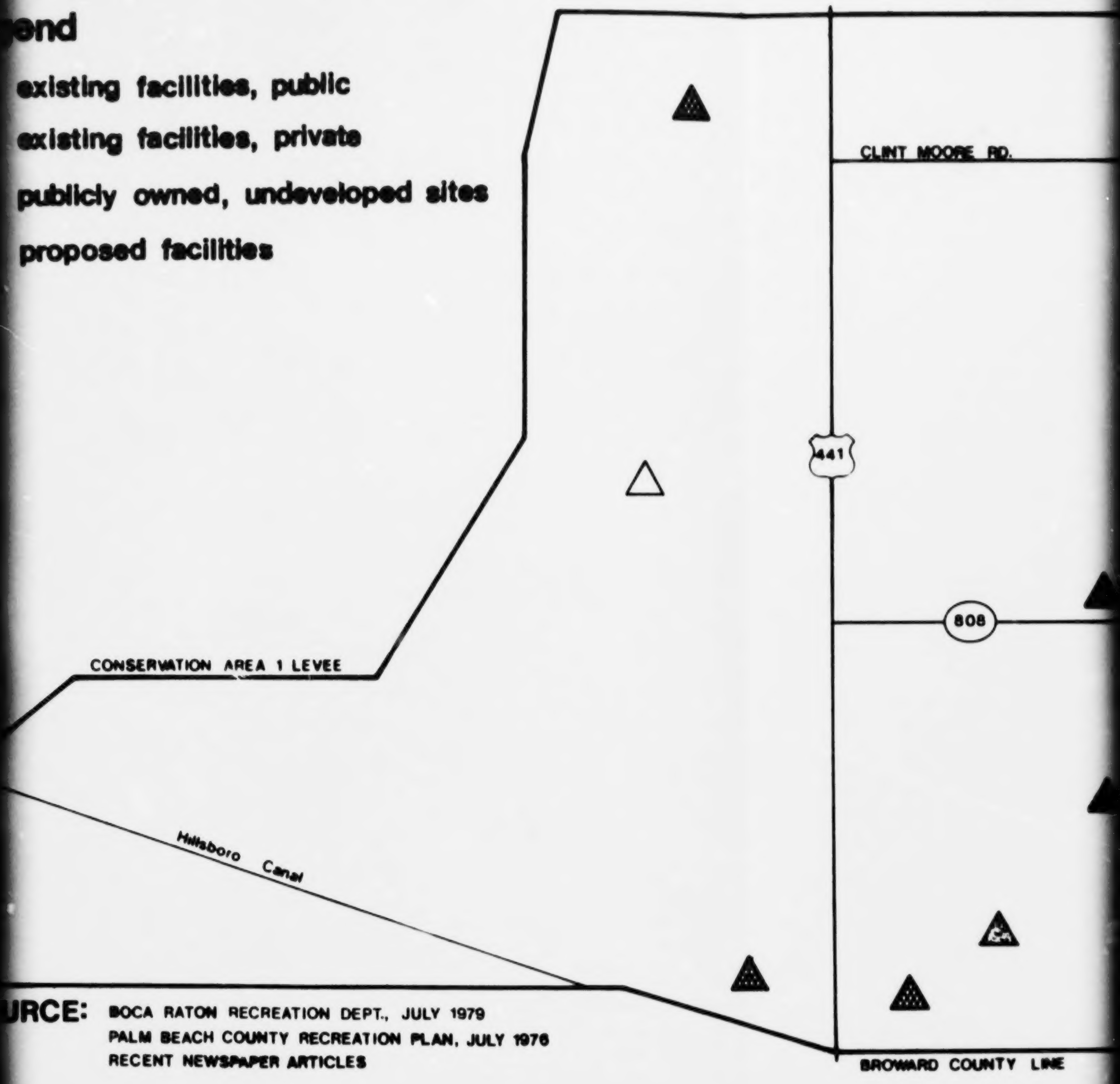
The predominant transportation characteristic of the area is its north-south orientation. The major highways (U.S. 441, the Florida Turnpike, I-95, U.S. 1 and SR AIA), the Intracoastal Waterway and the two railroads follow this pattern. There is no single roadway that completely traverses the area in an east-west direction.

Initially, these facilities allowed travelers to pass through the area with Miami-Ft. Lauderdale as their destination. As that area developed, these facilities have acted as funnels for the northward expansion of urban development. The completion of I-95 northward through the area resulted in further acceleration of this trend. It provides easy access to the major employment centers outside the 201 planning area.

OUTDO

gend

- existing facilities, public
- existing facilities, private
- publicly owned, undeveloped sites
- proposed facilities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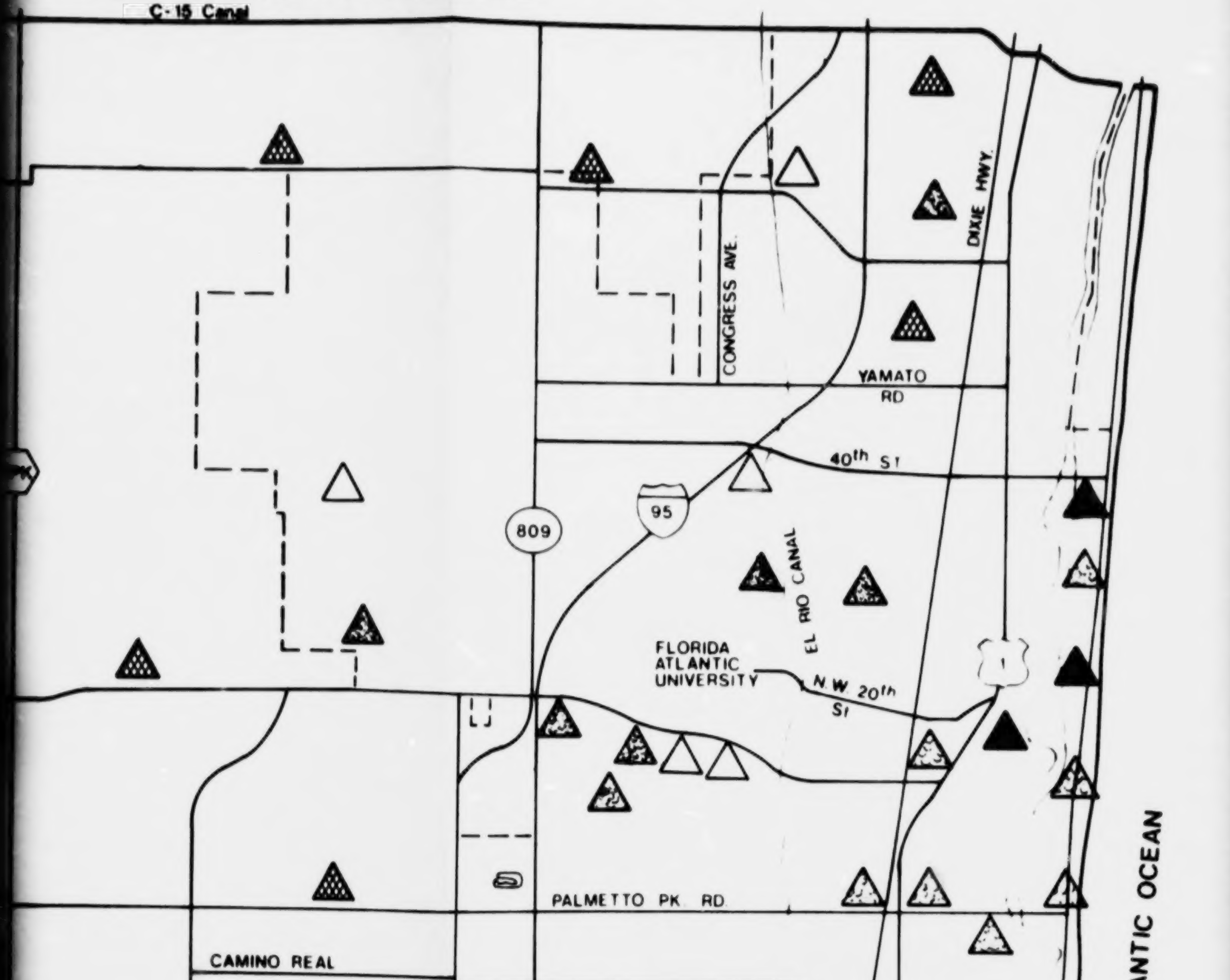
CONSERVATION AREA 1 LEVEE
Hillsboro Canal
BROWARD COUNTY LINE

URCE: BOCA RATON RECREATION DEPT., JULY 1979
PALM BEACH COUNTY RECREATION PLAN, JULY 1976
RECENT NEWSPAPER ARTICLES

SOUTHERN REGION PALM BEACH CO

OR RECREATION FACILITIES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ATLANTIC OCEAN

TY 201 AREA EIS

fig III-7

TABLE III-9

OUTDOOR RECREATION FACILITIES

Facility Name	Size (acres)	Ownership
Boca Island	1.5	Boca Raton
Por-la-Mor Park	0.5	Boca Raton
Hughes Park	5.0	Boca Raton
Meadows Park	12.0	Boca Raton
Sanbourn Square	0.5	Boca Raton
Silver Palm Park	2.0	Boca Raton
University Woodlands Park	15.0	Boca Raton
Silver Palm Park	2.0	Boca Raton
Memorial Park	18.0	Boca Raton
Unnamed (W. Palmetto Park Road)	13.0	Unknown
South Beach Park	98.0	Boca Raton
Spanish River Park	79.0	Boca Raton
Lake Wyman Tract	60.0	Boca Raton
Harrison Tract	187.0	Boca Raton
Schine Tract	67.0	Boca Raton
South Inlet Park	11.0	Palm Beach County
Boca Raton Country Club	56.0	Private
Boca Raton Hotel & Club	121.0	Private
Boca Teeca Golf Club	210.0	Private
Royal Palm Yacht & Country Club	145.0	Private
Boca Raton Municipal Golf Course	13.0	Boca Raton
Broken Sound Golf Club	N/A	Private
Southern Manor Golf Course	N/A	Private
Hillsboro Country Club	N/A	Private
Sandalfoot Country Club	N/A	Private
Boca West Facility	N/A	Private
Boca Del Mar Facility	N/A	Private
Mitchell School - Joint Use	20.0	Palm Beach County
Boca Raton High School	20.0	Palm Beach County
Boca Middle School	20.0	Palm Beach County
Addison Mizner School	15.0	Palm Beach County
Boca Elementary School	6.8	Palm Beach County

Sources: *Recreation/Open Space Planning - A Guide For Local Government*; Area Planning Board of Palm Beach County, June 1978.

Boca Raton Comprehensive Plan, April 1979

SR 808 (Glades Road) remains the only access point to the Turnpike within the study area. This highway provides the only continuous east-west access between U.S. 441 and U.S. 1. Its recent widening east of the Turnpike was completed in response to its importance as an east-west access route.

There will likely be disruption of traffic during construction of the force mains. All of the force mains will be built within the right-of-ways of major roads. Therefore, surrounding land uses will not be directly affected by the construction.

The construction of the regional force main from U.S. 441 along Glades Road to the treatment plant will likely cause the most traffic disruption of all the force main construction activities since the right-of-way under the Turnpike is extremely narrow. There are plans to four-lane this section of Glades Road in the near future. This section of the roadway will undergo sever distruption during the widening. Therefore, it would be prudent to construct the force main at the same time the road is widened.

A large increase in area traffic is projected based upon the expected increase in population. The anticipated impact of this increase on the projected number of trips is shown in Table III-3. This increase in number of trips will result in more congested driving conditions on all major highways in the area unless significant improvement are made to the area's highway system.

Resource Use

Electric power for all of the southeast Florida area is supplied by the Florida Power and Light Company (FPL). FPL facilities are part of a cooperative statewide power supply interconnection system. Natural gas is supplied to the area by a pipeline from Texas.

There will be sufficient lead time to plan for new facilities should it become necessary in the future. The Florida Power Plant Siting Act (Chap. 403, Part II) requires all electric power companies to prepare a 10-year master plan for new facility needs. These are annually updated in April.

Table III-10 depicts the projected power consumption throughout the study period. The estimates were determined by utilizing data contained within the Ten Year Power Plant Site Plan 1978-87 submitted by FPL in April 1978.

TABLE III-10

PROJECTED ELECTRIC POWER CONSUMPTION

(millions of KWH)

Year	Residential	Commercial	Industrial	Total	Percent Increase
1978	251.90	168.00	7.30	427.30	N/Ap
1980	292.90	195.00	8.46	496.40	14
1985	440.50	294.00	12.80	747.30	34
1990	671.20	447.00	19.40	1137.60	34
1995	842.50	561.00	24.40	1427.40	20
2000	990.60	660.00	28.70	1679.30	15

Source: Stottler Stagg & Associates Estimates, June 1979.

Air Quality

The Southern Region Palm Beach County 201 Area is located in Air Quality Control Region (AQCR) 50 which includes Dade, Broward, and Palm Beach Counties. The Palm Beach County Health Department, Air Pollution Section, administers the air quality of Palm Beach County through a series of monitoring stations, three of which are located in Boca Raton. The parameters monitored in the Planning Area are total suspended particulates, benzene soluable organics, sulfates, nitrates, nitrogen dioxide, sulfur dioxide, total oxidants, and hydrocarbons. Table III-11 presents specific air quality data collected in Boca Raton during 1977. The primary source of air pollution in the Planning Area is the motor vehicle. No heavy industry is present.

The future air quality of the Planning Area will be similar whichever alternative is selected for treatment and disposal. This is due to the fact that air quality degradation in this area is basically a product of the increased traffic conditions being generated by the the population increase. The year 2000 population projections are expected to be similar under all of the alternatives, including no Federal action. The high levels of projected population increase will cause a decrease in air quality conditions. However, no significant problems are expected. Favorable wind conditions in the area will likely keep air quality conditions within acceptable ranges.

Noise

There is no comprehensive noise monitoring program in the area. The City of Boca Raton does, however, have a noise control ordinance. The most prominent noise generators in the area largely involve transportation facilities. These include the Boca Raton Airport, the Railroad Corridor, Federal Highway, I-95, Florida's Turnpike, Glades Road, and Palmetto Park Road.

The Planning Area has relatively low ambient noise levels. Short-term noise impacts can be expected with pipeline and facility construction and are caused by movement of heavy equipment, possibly blasting and ditch digging. Facility operation and maintenance noise includes operation of mechanical aerators and some increase in vehicular traffic. No significant noise problems have been identified at the existing facilities and none are expected in the future as a result of this project.

TABLE III-11
AIR QUALITY OF THE SOUTHERN REGION PALM BEACH COUNTY 201 AREA
(Boca Raton, Florida)

Monitoring Station Location	Suspended Particulates Arithmetic Average ug/m^3				Sulfur Dioxide ppm[a]	Nitrogen Dioxide ppm[b]	Total Oxidants ppm[c]	Hydro-carbons ppm[d]
	Total	Organics Benzene Soluable	Sulfates	Nitrates				
Boca Raton Fire Station #1	39.3	1.79	5.52	1.56	0.010	0.024	0.032	4.2
College of Boca Raton	29.8	1.76	5.52	1.36	ND[e]	ND	ND	ND
Florida Atlantic University	ND	ND	ND	ND	ND	0.006	ND	ND

Source: Palm Beach County Health Department, Division of Environmental Science and Engineering, Air Pollution Control. [1978?] Annual Report, 1977. Palm Beach, Florida. 77 pp.

[a] Mean of 24-hour maximums taken at intermittent periods during the year.

[b] Mean of arithmetic means taken at intermittent periods during the year.

[c] Mean of 8-hour maximums taken at intermittent periods during the year.

[d] Maximum ambient concentration over an 8-hour period.

[e] No data, parameter not monitored at this station.

Odors

The Southern Region Palm Beach County 201 Area has no heavy industry and very little light industry which produce odors. In general, the land use plan for Boca Raton separates industrial areas from residential areas. Odor has not historically been a significant problem.

This Planning Area has had very few odor problems in the past from any sources. It is not expected that any of these wastewater management alternatives will lead to any significant problems in the future. The alternatives with two and three treatment plants will have a slightly greater chance of operation and maintenance problems leading to odor episodes. Any odors related to sludge management will be addressed in the Final EIS.

Topography and Geology

The Southern Region Palm Beach County 201 Area lies within three physiographic provinces of south Florida-Coastal Ridge, Sandy Flatlands, and Everglades. The area is quite flat with elevations seldom exceeding 25 feet. The highest elevations occur on the Coastal Ridge which slopes downward towards the flat western portion of the Planning Area.

The region has no major streams or rivers as the drainage pattern south of Lake Okeechobee has historically been by sheet flow through the Everglades. However, developmental pressure by man has required that the water level be managed by a network of canals to maintain water level during dry periods and facilitate drainage of excess water during wet periods.

The South Florida Water Management District and the Lake Worth Drainage District have responsibility for the extensive canal network in the Planning Area. The primary canals are the C-15 and Hillsboro Canals which flow into the Atlantic Ocean. Several second-order canals, oriented in a north-south direction, flow into the C-15 and Hillsboro, and numerous smaller canals and ditches extend perpendicularly to the system described above. At present, the canal system is very extensive and no new water management facilities are planned except to update or replace existing structures.

The Florida Peninsula is the exposed ridge portion of a broad extension from the North American continent. It consists of a mantle of marine sediments (approximately 15,000 feet thick in the study area) overlying a core of metamorphic and igneous rocks. The different marine sediments are significant not only as exposed surface material, but also because their differential permeabilities are responsible for the aquifers which provide most of South Florida with its water supplies. The geology will therefore be discussed in some detail.

The shallow non-artesian Biscayne Aquifer, from which the City of Boca Raton currently draws its water supplies, includes the Pamlico Sand, Anastasia Formation, Miami Oolite, Fort Thompson Formation, and Caloosahatchee Marl. The relatively impervious Tamiami Formation and Upper portions of the Hawthorn Formation form an aquiclude beneath the Aquifer.

The surface geology of the Southern Region Palm Beach 201 area is uncomplicated: only two formations are present. Miami Oolite occurs in the south and west of the Planning Area; in the northeast it intergrades into the Anastasia Formation. Both are generally covered by either Pleistocene Pamlico Sand (on the coastal ridge) or organic soils (in the low-lying areas to the west), so actual outcrops are very rare.

Geology imposes no constraints on or difficulties in construction within the Planning Area. Soils, features closely related to and derivative from the geology, however, do require careful consideration and planning for construction.

No significant impacts are expected from any of the alternatives to the geology or topography of the Planning Area.

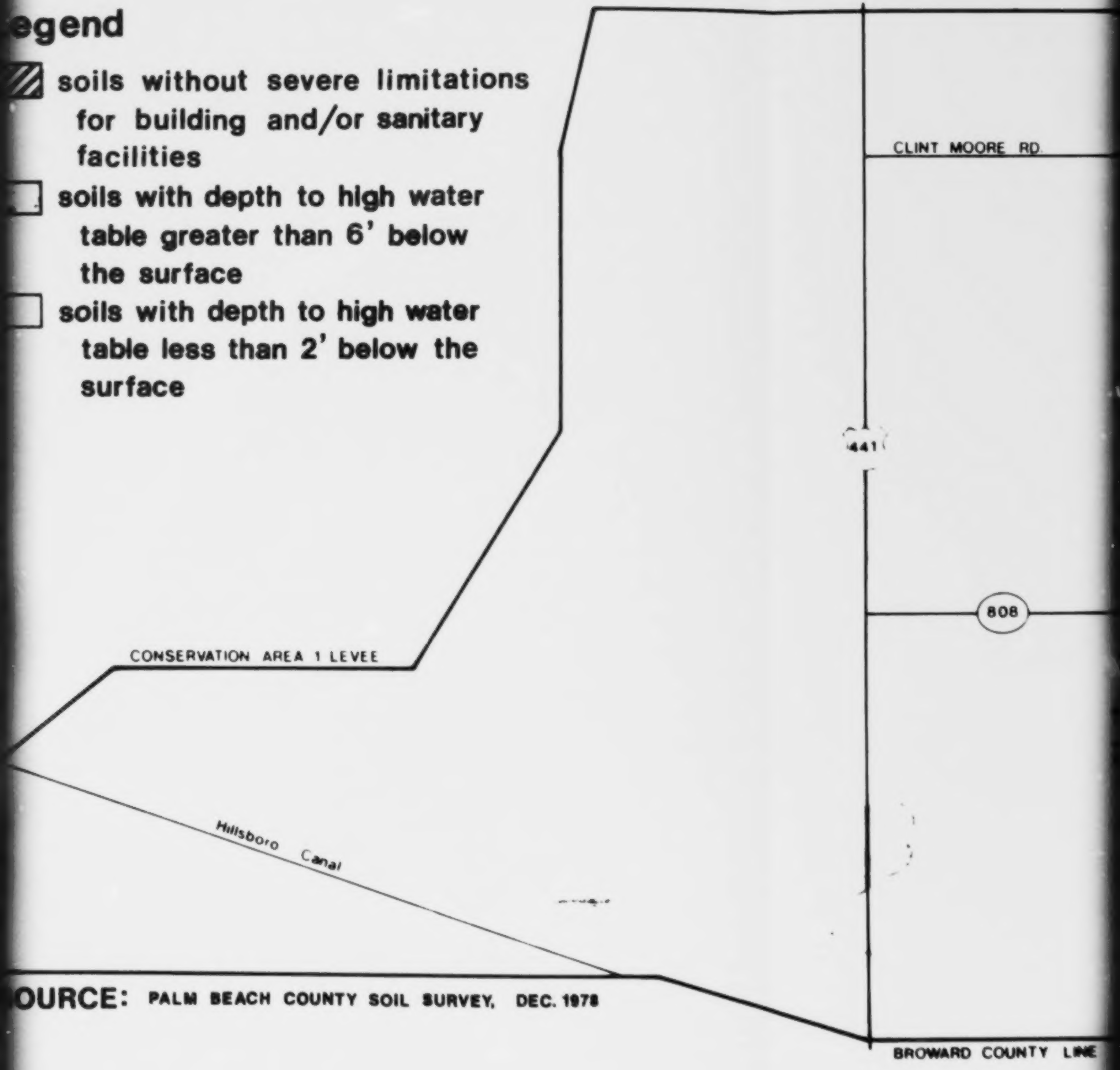
Soils

The Soil Conservation Service (SCS) published the Soil Survey for Palm Beach County in December 1978. Figure III-8 summarizes these limitations in graphic form. It also shows the depth of the seasonal high water table. For graphic simplicity's sake, this latter limitation is shown for only those soils west of I-95.

CH

egend

- ▨ soils without severe limitations for building and/or sanitary facilities
- ☐ soils with depth to high water table greater than 6' below the surface
- ☐ soils with depth to high water table less than 2' below the surface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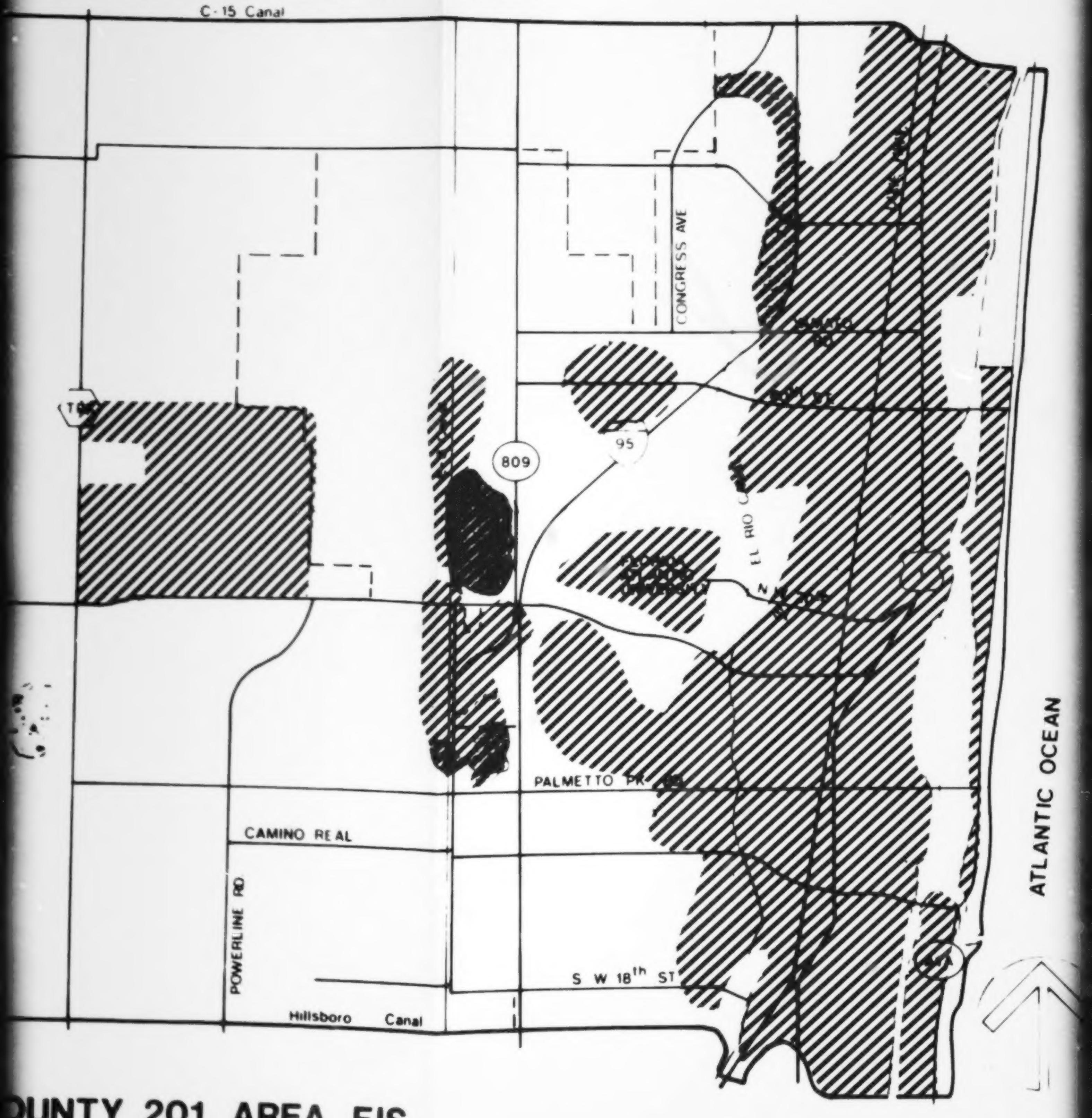
CONSERVATION AREA 1 LEVEE
Hillsboro Canal
BROWARD COUNTY LINE

OURCE: PALM BEACH COUNTY SOIL SURVEY, DEC. 1978

SOUTHERN REGION PALM BEACH C

HARACTERISTICS OF SOILS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OUNTY 201 AREA EIS

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The term slight limitation means that the soil properties and features are generally favorable for that use and that the limitations that are present are minor and can be easily overcome. The term moderate limitation means that the soil properties and features are generally unfavorable for that use, but can be overcome or minimized by special design and planning. The term severe means that the soil properities and features are generally so unfavorable and difficult to correct or overcome that major soil reclamation, special design or intensive maintenance is required.

The Soil Survey also states that "in many of the soils that have moderate or severe limitations for use as septic tank absorption fields, it may be possible to install a special system to lower the seasonal water table or to increase the size of the absorption field so that performance is satisfactory" (pg. 76). This report also states that "imprevious soil that is at least 4 feet thick is required for the lagoon floor and sides to minimize seepage and contamination of local groundwater. Soils that are very high in organic matter content and have stones and boulders are undesirable. Unless the soil has very slow permeability, contamination of local groundwater is a hazard in areas where the seasonal high water table is above the level of the lagoon floor. If the water table is seasonally high, seepage of groundwater into the lagoon can seriously reduce the capacity for liquid waste" (pg. 76).

A seasonal high water table is the highest level of a saturated zone more than 6 inches thick held in soils for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils at the site in question. Therefore, Figure III-8 shows that, with the exception of a few areas, all of the soils west of I-95 have a depth of less than 6 feet to the seasonal highwater table. In fact, virtually all of the soils west of I-95 have a depth of less than 2 feet to the seasonal high water table.

The months of the year that the high water is commonly present is also an important limitation. The soils shown as having a depth to the water table of less than 6 feet generally have high water conditions from June through November and often through February. Therefore, the soils in these areas experience high water conditions six or more months out of the year.

The reader should be cautioned to remember that the Soil Survey is generalized over the entire Planning Area. The results of that document are further generalized for purposes of this study.

The County Comprehensive Plan projects service by septic tanks in subbasins F and I of the Planning Area. Proper testing by the Palm Beach County Health Department and proper maintenance procedures by the customers should preclude any significant adverse impacts.

Vegetation

The vegetation of Boca Raton is highly diverse in number of species and biotic communities. Such diversity is directly correlated with diversity of abiotic environmental features: topographic, geologic, pedologic, hydrologic, climatic, and physiographic. Although the warm, humid subtropical climate is generally favorable for plant growth, local topographically-determined variations in hydrology and pedology provide very different environments. Moisture availability varies from extremely hydric (wet) to extremely xeric (dry), salinity from highly saline to fresh, and soils from very organic (peat) to very mineral (white sand). Variations in these and other environmental factors create a diversity of habitats to which various plant species and associations are adapted. Distribution of faunal species in the area is in turn determined by shelter, food, and nesting resources provided by the plant associations. These interdependent associations of biota are termed biotic communities.

Thus, a biotic community represents a significantly different and recognizable combination of abiotic features (climate, geology, pedology, hydrology, topography, and physiography) and biotic features (flora and fauna) which have a strong correlation among themselves and a much lesser connection with features of adjoining areas. Biotic community boundaries are rarely sharp, and relatively arbitrary decisions are sometimes necessary where a continuum exists between two different associations.

It should be stressed that environments and biotic communitities are dynamic; natural events, such as tidal inundation, storm flooding, sediment deposition, and fire, strongly influence the abiotic and biotic elements of the biotic community. Disturbances related to man, such as development, drainage, sewage, water draw-down, fire, introduced species, and agriculture, also have profound effects on biotic communities. All of these factors, considered through time, will produce successional change in community distribution and condition.

Successional patterns are complicated in the Planning Area by a variety of natural and man-induced factors: fire, hurricanes, droughts, drainage, lowering of the water table, mechanical disturbance, and aggressive introduced species. Coastal Hammock and Low Hammock would appear to be the "true" climaxes in upland situations in the absence of fire. However, fire is naturally so frequent in this habitat that "true" climaxes are much more the exception than the rule. More frequently, the successional trend toward this arborescent community is halted permanently or semi-permanently by periodic fire, and scrub, dry prairie, or pine flatwood communities persist. These communities may be termed topo-edaphic climaxes, and are just as important and natural a part of the vegetation as the "true" climax.

Natural conditions in southern Florida are extremely dynamic; the geological youth of the area, sea level variations, periodic drought, fire, and catastrophic events such as hurricanes have created continuously shifting vegetation patterns in the area. Since man's influx into the area in the 20th century, environmental change has been vastly accelerated, to the point where even those areas which have not been directly affected by construction and disturbance have been strongly modified by watertable draw-down (resulting in a greater frequency of fire), ditching and drainage, and aggressive invasion by various introduced species. Development and other less direct disturbances of the natural environment are currently taking place at such a rate that few first-rate examples of the native vegetation remain in the Planning Area.

The vegetation map Figure III-9 is based on the Boca Raton Comprehensive Plan, and limited field reconnaissance and verification by Coastal Zone Resources biologists. Since much of the existing information is several years old and development is occurring at a very rapid rate, many of the areas shown as native vegetation may at this time or at some time in the near future be changed to "Urban Disturbed Built-Up". Much of the agricultural land in the western half of the Planning Area is already committed for residential development. Some portions of the map are already out of date; others will undoubtedly become so in the next few years.

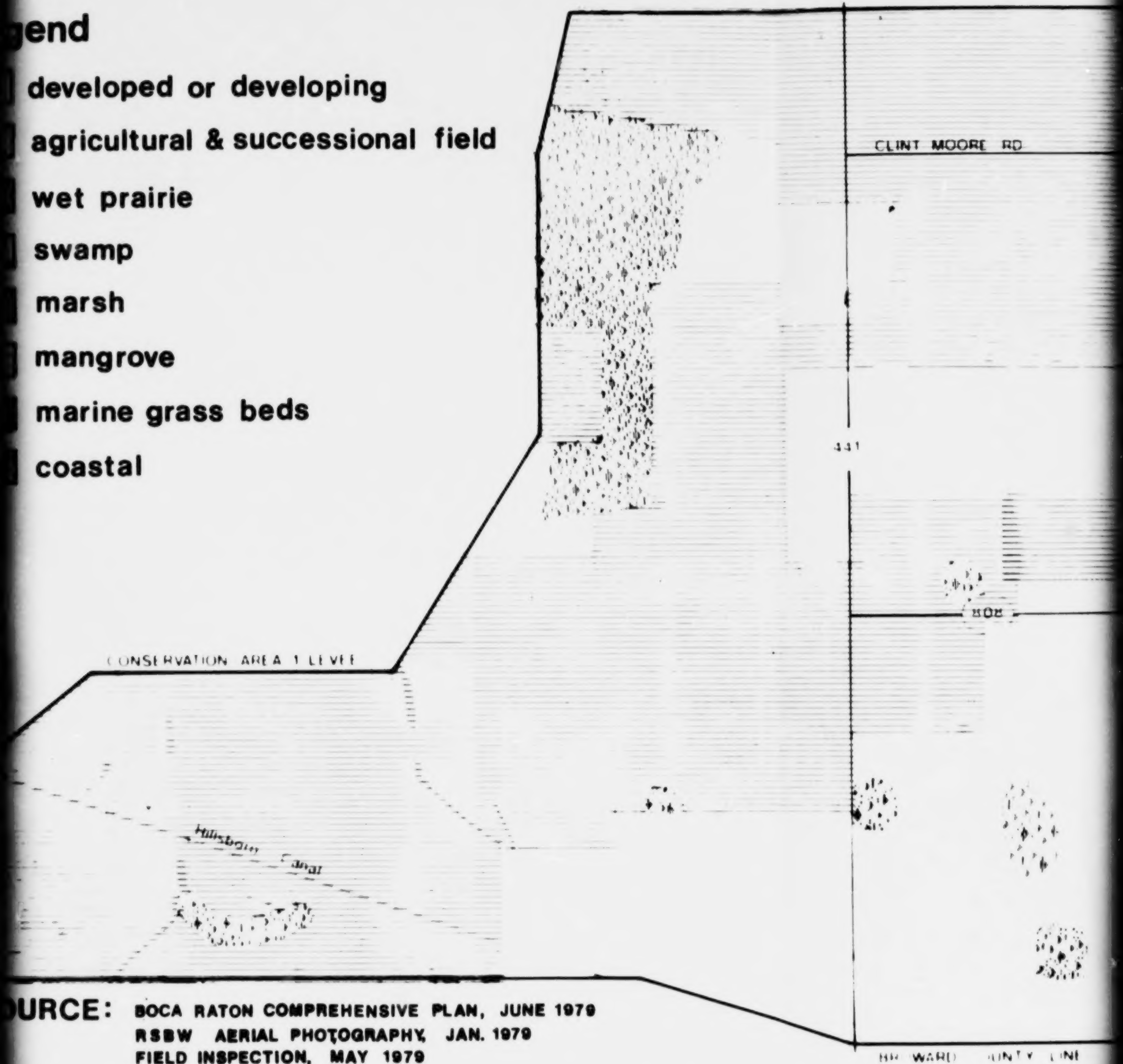
Ideally, most relatively intact and undisturbed areas of native vegetation should be protected from further development for a variety of reasons:

1. They provide valuable recreational and open-space land in an increasingly urbanized area.
2. They provide valuable wildlife habitat.
3. They provide habitat for a relatively large number of rare, endangered, endemic, and unique animal and plant species, found nowhere else in the United States.
4. They have high scientific and educational value.
5. They have been reduced to a small fraction of their extent prior to this century.
6. Wetlands reduce contaminant loading, aid in nutrient cycling, protect other areas from erosion and flooding damage, and have a high biological productivity.
7. Uplands are critical for aquifer recharge and reduction of storm run-off.

The projected population and land use changes discussed earlier in this chapter will significantly decrease the amount of undeveloped land in the Planning Area. This will lower the diversity and amount of vegetative species. No appreciable difference is expected among the alternatives with respect to this impact.

Wildlife

The Planning Area has a wide range of wildlife habitats including urban, scrub, swamps, freshwater canals and ponds, and estuarine waters of the AIWW and adjacent finger canals. The ranges of certain animals are restricted by very specific habitat requirements, but many species, especilly birds and mammals, are highly mobile and may utilize several of the plant communities reqularly. Appendix C characterizes the animal species found in the Planning Area.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CONSERVATION AREA 1 LEVEE
Hillsboro Canal
BR WARD UNTY LINE

URCE: BOCA RATON COMPREHENSIVE PLAN, JUNE 1979
RSBW AERIAL PHOTOGRAPHY, JAN. 1979
FIELD INSPECTION, MAY 1979

SOUTHERN REGION PALM BEACH CO

VEGETATION

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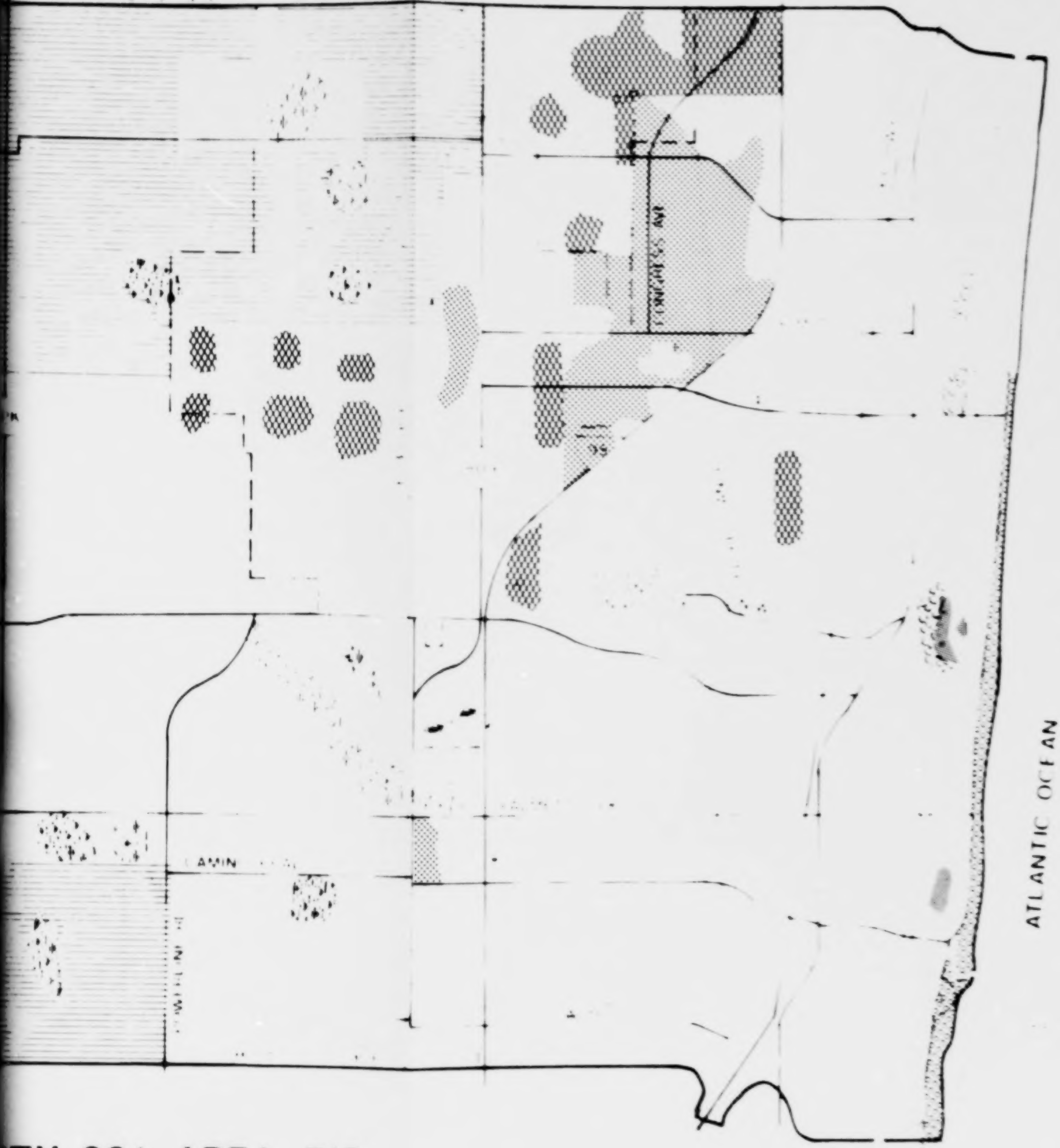
ATLANTIC OCEAN
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TY 201 AREA EIS

fig III

No primary impacts are expected to occur as a result of this project, since most possible construction areas have already been disturbed. The decrease in vegetative habitat discussed above will lead to a concurrent decrease in the wildlife present in the project area.

Sensitive Areas

The section regarding sensitive areas is intended to identify those areas or sites which will require special attention during the impact analysis phase. Such areas include the beach; the habitat of the manatee; the archeological, historical and recreational sites noted previously; water recharge areas; the buffer zone along the Conservation Area; floodprone sites; scattered wetland areas; and the winter vegetable croplands. Most of these areas are shown in Figure III-10 and III-11.

As mentioned, the manatee regularly inhabits the Intracoastal Waterway, particularly during the winter months. Sea turtles nest during the late spring and early summer along the Boca Raton beaches. The marine grass beds in Lake Wyman and Lake Boca Raton have been identified as significant natural resources.

Mangrove communities exist in the Lake Wyman area and the 40th Street-Intracoastal Waterway area. Other significant vegetative communities are found in the marsh area around the confluence of the El Rio Canal and the C-15 Canal, as well as along the Conservation Area levee.

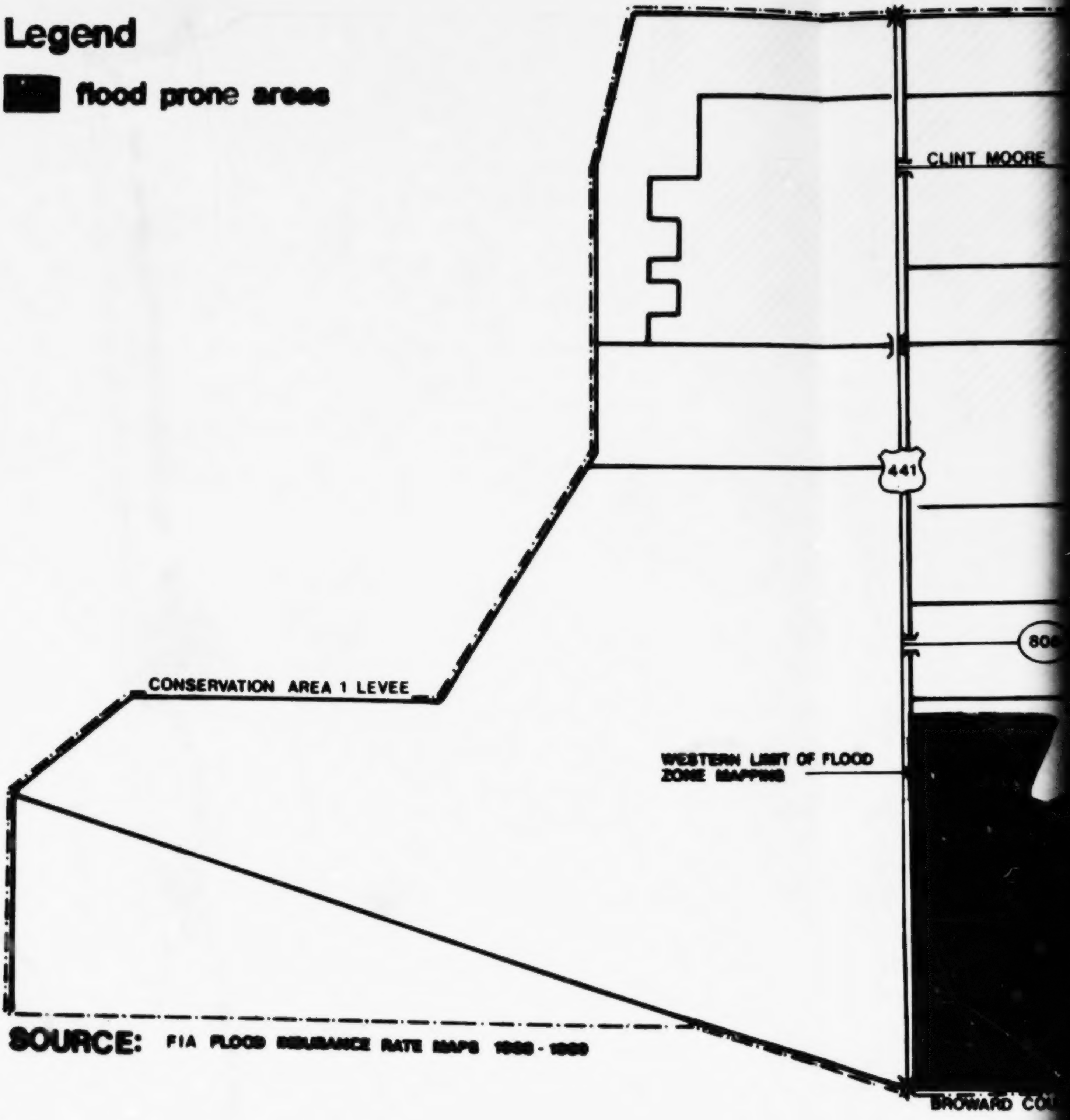
The Schine tract and the Lake Wyman tract represent important areas that contain a variety of threatened and endangered species. The proposed regional park sites at Boca Teeca, Patch Reef and west of U.S. 441 are potential recreation resources.

Figures III-6 identified the archeological and historic resources of the area. Most of the archeological sites have been disturbed on one or more occasions. The historic areas represent sites worthy of nomination to the National Register of Historical Places. A more complete description of the threatened and endangered species and their habitats is found in the wildlife section of this chapter.

The winter vegetable cropland area described earlier in this chapter shown in Figure III-2. It is projected that, if Palm Beach County land use policies remain unchanged, all of these lands will be converted to urban development by the Year 2000 with the exception of the area within the County, south of the Hillsboro Canal.

Legend

▇ flood prone areas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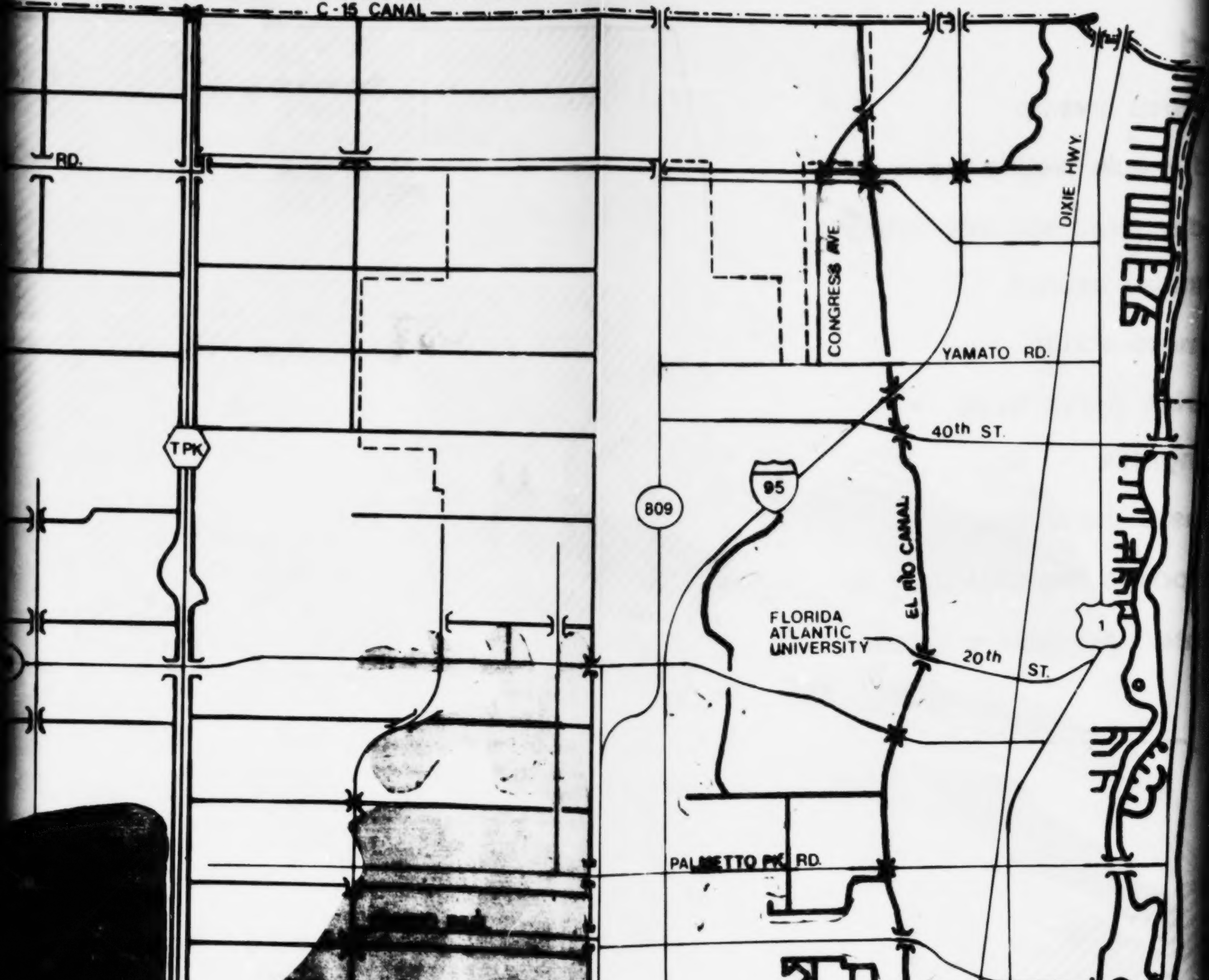
WESTERN LIMIT OF FLOOD ZONE MAPPING
BROWARD CO

SOURCE: FIA FLOOD INSURANCE RATE MAPS [illegible] - [illegible]

SOUTHERN REGION PALM BEA

FLOOD PRONE AREAS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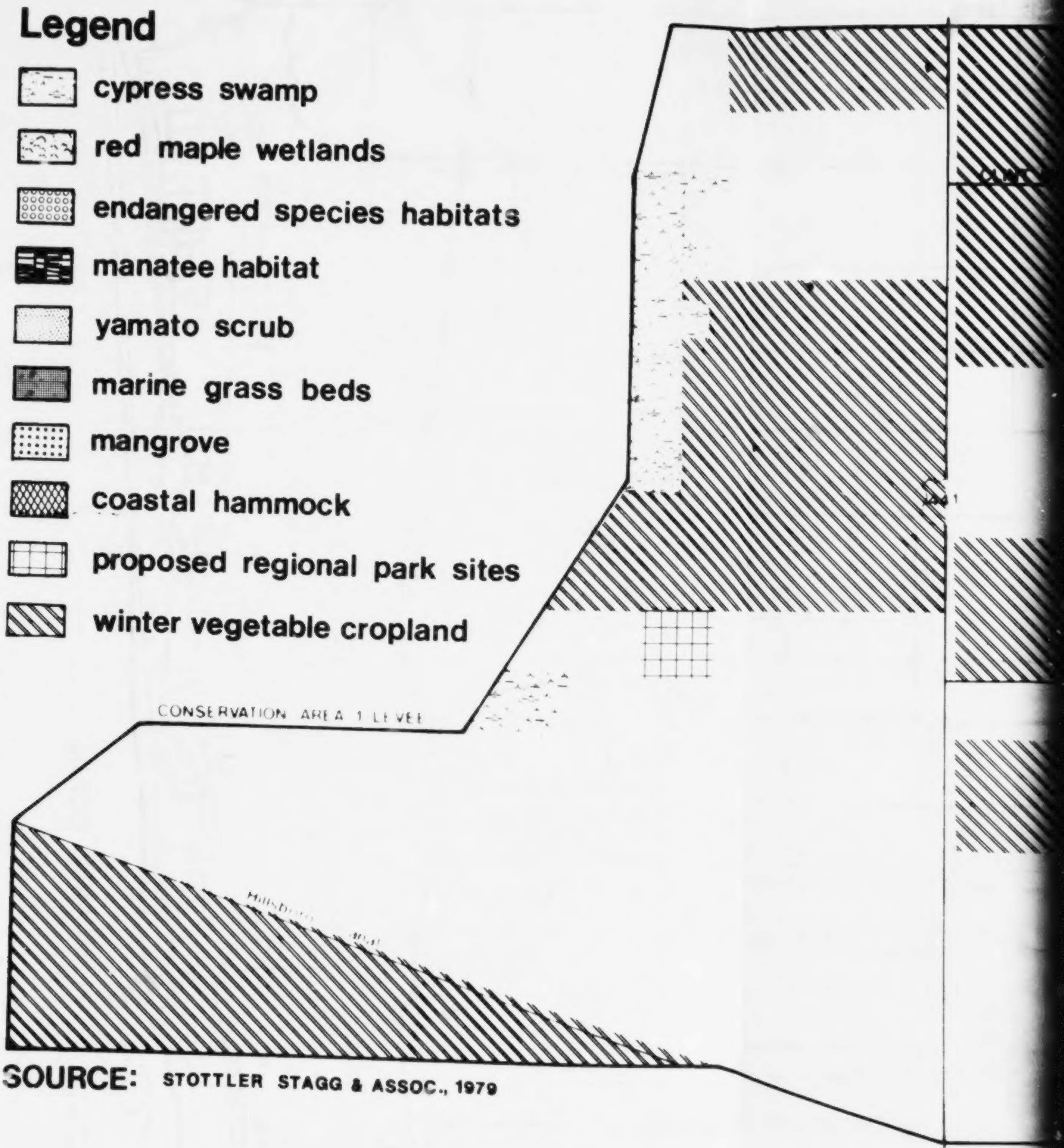
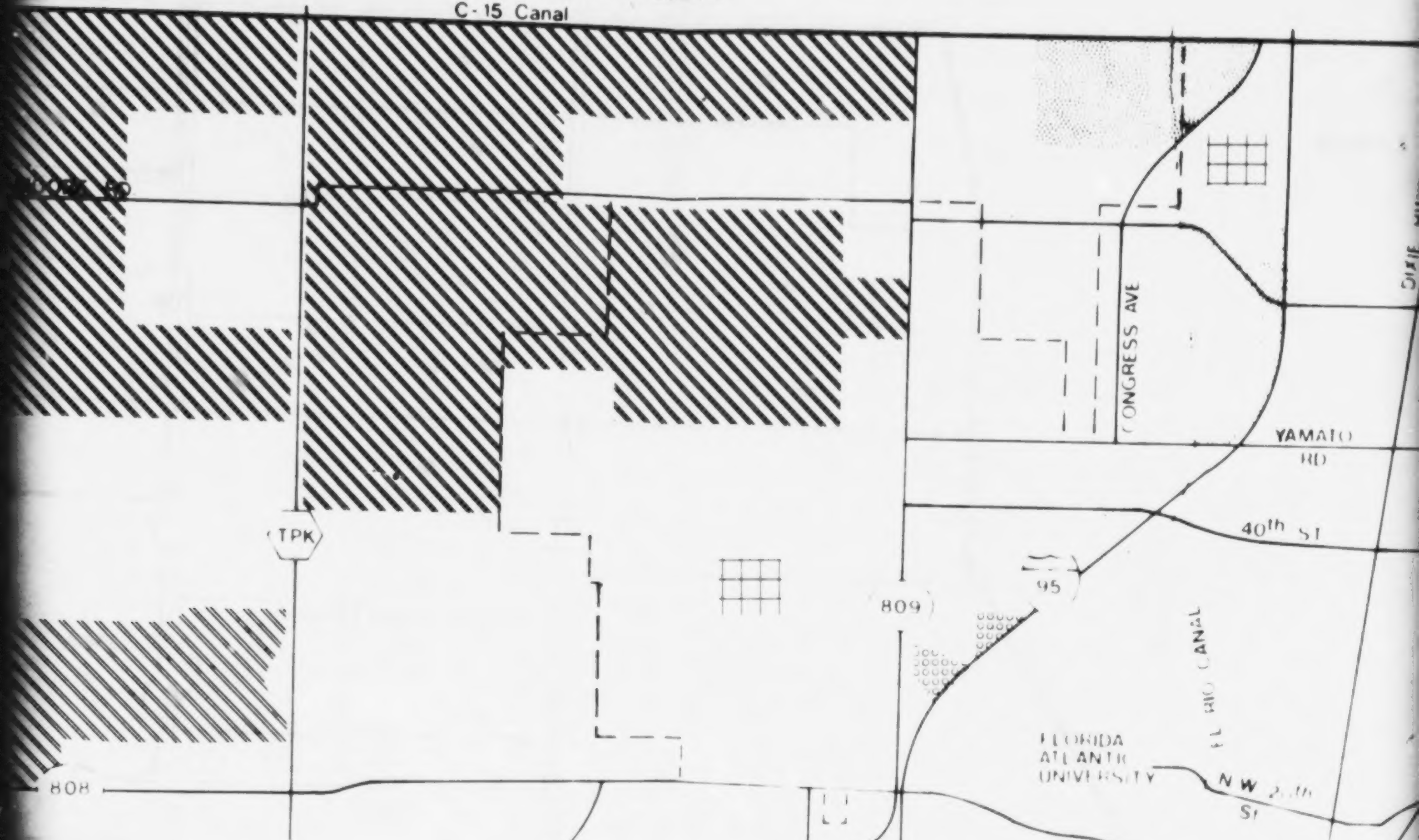

Legend
cypress swamp
red maple wetlands
endangered species habitats
manatee habitat
yamato scrub
marine grass beds
mangrove
coastal hammock
proposed regional park sites
winter vegetable cropland
CONSERVATION AREA 1 LEVEE
Hillsboro
BROWAR

SOURCE: STOTTLER STAGG & ASSOC., 1979

SOUTHERN REGION PALM B

SENSITIVE AREA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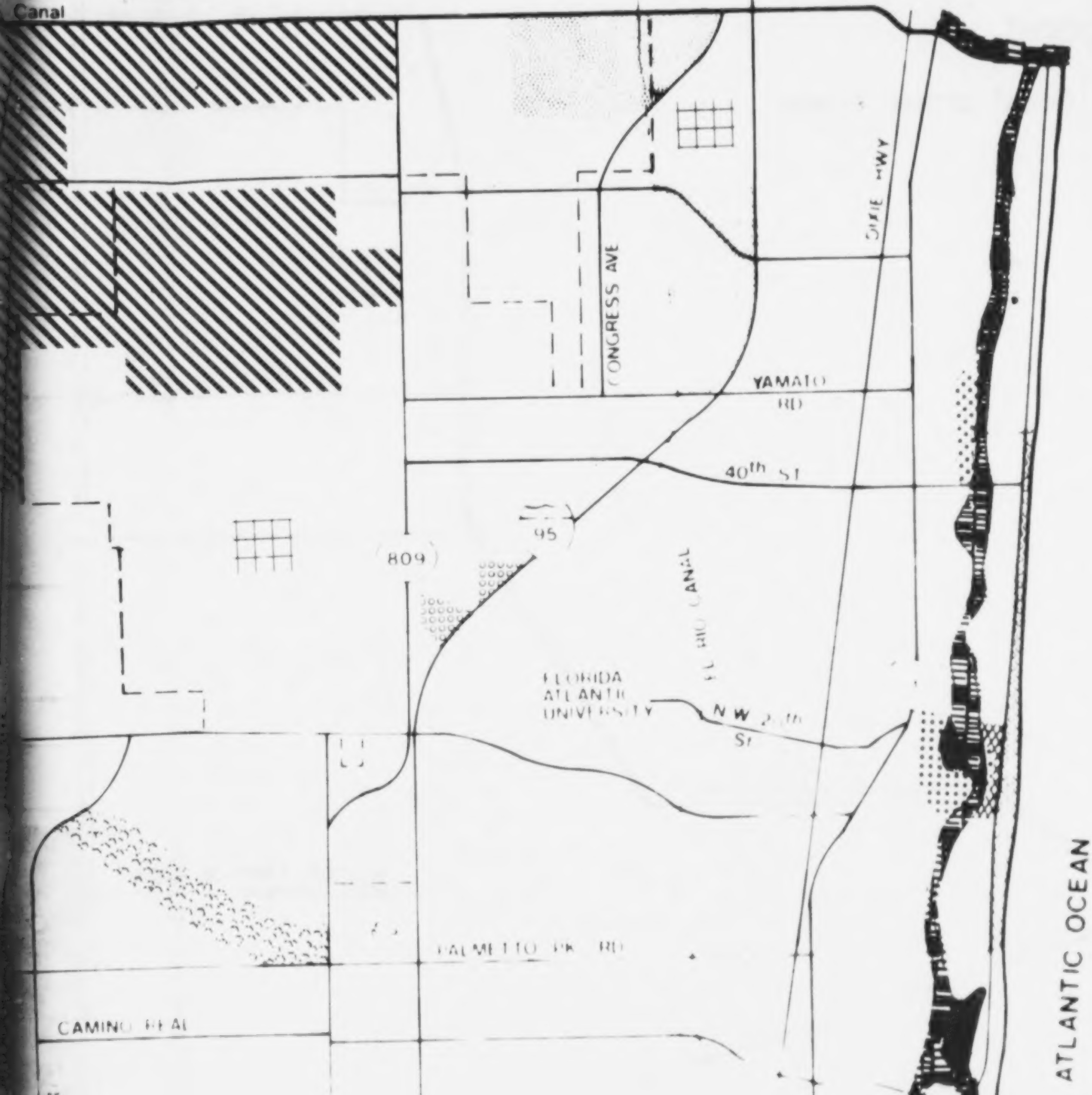
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fig III-11

The major impact to the sensitive areas discussed above is the conversion of the unique agricultural lands to urban dvelopment. These impacts are discussed in the land use section of this chapter.

Impacts to other specific sensitive areas may result from the projected conversion of most of the Planning Area to urban land uses. Local land use decisions will determine the extent of these impacts.

Part C: Mitigative Measures

Introduction

The most significant impacts which were identified in Part B of this chapter include; a continued high rate of development throughout the unincorporated area, continued in-filling in the already urbanized areas, the loss of unique agricultural lands, an increase in the overcrowding of community services and facilities, increased demand on the limited water supply capacity, and increased point and non-point source discharges to the Biscayne Aquifer. Other more minor impacts are related to construction activities and facility operation.

A significant part of the EIS process is the evaluation of measures which may be used to mitigate these potential impacts. Mitigative measures may be structural or non-structural in nature. For example, reducing the system capacity to preclude sewer service to Subbasins F and I is a structural mitigative measure. Non-structural mitigative measures are applied land management related practices. They include public acquisition of land and development rights, provision of incentives to encourage the protection of unique agricultural and environmentally significant lands, and land use regulation. The following mitigative measures are selected from an extensive array of techniques. The selected measures are presented because of their relevance to the identified impacts.

The committed nature of much of the Planning Area limits the effectiveness of some of the suggested mitigative measures. The purpose here is to provide a list of possible structural and non-structural actions that may be used to mitigate the impacts cited previously.

Non-Structural Mitigative Measures Relating to In-Filling

The principal impacts resulting from in-filling urbanized areas are the loss of desirable open space in the form of potential park and recreational sites, environmentally sensitive lands, and historic and archaeological sites, as well as an increased burden on public facilities. Appropriate non-structural mitigative measures include: (1) impact fees and dedication requirements, (2) identification and protection of significant historical and archaeological sites, (3) density transfers and density bonuses, and (4) land banking.

Impact fees and dedication requirements are typical measures utilized by local governments to reduce the impacts of in-filling in urbanized areas. Impact fees are charges paid to a local government by new users for the privilege of gaining access to the public services and facilities. The rate charged is the prorata share of the expense incurred by the local government in providing the public service or facility. Dedication requirements provide for the transfer to a local government of lands to be used as sites for public services and facilities.

Dedications operate on the same principal as impact fees. The increased burden upon public services and facilities created by new residents is offset by the developer providing land for additional schools, fire and police stations, or public parks and recreation facilities.

Impact fees and dedication requirements are included in local government land use regulations. PUD approval or final plat approval is often made contingent upon satisfaction of the dedication requirements or fee-in-lieu of payment.

The City of Boca Raton presently requires developers to dedicate land for parks and recreation purposes or pay a fee-in-lieu of the dedication. Developers of PUD's in Boca Raton may be required to dedicate land for community facilities, such as schools or government offices, if the City Council determines that these services are needed. In addition, impact fees are assessed for connecting to the City sewer and water systems. The Boca Raton impact fee and dedication requirements could be amended to specifically require the dedication of environmentally sensitive lands and significant historical or archaeological sites.

Protection of significant historic and archaeological sites is the process of identification, registration, protection, enhancement and management of culturally valuable sites or properties. It is the policy of the Federal government, the State, and the City of Boca Raton to protect significant historical and archaeological sites. For example, for every major federal action affecting the natural and man-made environment, Section 101(b)(4) of the National Environmental Policy Act directs the involved federal agency to "coordinate federal plans, functions, programs, and resources....preserve important historic, cultural, and natural aspects of our national heritage...." Chapter 267, F.S., the Florida Archives and History Act, provides for the protection of historic and archaeological resources on state lands and encourages their protection on privately-owned land. Chapter 79-255, Laws of Florida, provides a means for the State to purchase valuable historic and archaeological properties and bring them under the protection of the Archives Act. If preservation of significant sites is not feasible, provision is made for the recording of data contained in the objects, sites, or structures. Significant sites are those properties which are listed, or determined eligible for listing, in the National Register of Historic Places, in accordance with 36 CFR, Part 60 ("National Register of Historic Places; Nominations by State and Federal Agencies").

To protect unknown sites, the City and the County could require a developer to request from the Florida Division of Archives, History and Records Management a determination of the likelihood of presently unknown sites or properties occurring on the subject property. If the Division determines that the probability is high, then the performance of an historic and archaeological site assessment survey could be required as a condition precedent to development plan approval. Discovery of a significant site or property, as determined by the City or County upon recommendation from the Division, provides the basis to require private preservation by restrictive covenants, dedication for public purpose, public acquisition, recording of data or removal of artifacts.

A density bonus is a grant of additional density given to a developer in exchange for dedicating a parcel of land for a public purpose. The grant of additional density is an incentive to provide park and recreational sites, and to preserve environmentally sensitive lands, and historic and archaeological sites.

For a land dedication of any portion of a parcel of land, the City or County could allow a transfer of the maximum number of dwelling units allowed for the dedicated area to any other portion of that parcel, or any other parcel of land, within the City. To the extent that the dedication exceeds any existing standard, the City may allow a density bonus resulting in a total transfer of up to a designated factor (i.e., two (2) times the maximum number of dwelling units designated for the dedicated area) to any other portion or parcel within the City or County.

A density bonus may be awarded according to a sliding scale that ranges between one hundred percent (100%) and two hundred percent (200%) of the maximum number of dwelling units allowable on the designated parcel. The amount of the density bonus is determined according to the quality, location, quantity and value of the land dedicated. Density bonuses should be permissible only for (a) lands dedicated in perpetuity for a public purpose, (b) lands which exceed standard dedication requirements, and (c) lands not included in dedications for other public purposes such as road right-of-ways, utilities and other community facilities. Density bonuses are additionally useful in protecting environmentally sensitive lands located in the western portion of the Planning Area.

Land banking involves public acquisition of undeveloped land for a designated public purpose. Acquisitions may be made for the purpose of permanently holding property for present or future use as a public park or recreation facility. Land banking preserves open space and environmentally sensitive lands as well as historic and archaeological sites from being consumed by the process of in-filling.

The process of establishing a land banking operation involves selecting a local administrative agency to serve as the land banking institution, conducting a survey to identify, assess and determine specific parcels of land or development rights to be acquired, negotiating the purchase of desired sites or, possibly, commencing eminent domain proceedings to condemn the property, issuing municipal bonds or establishing other means of financing the acquisitions, taking title to the property, and implementing a management program.

Land banking implements the policies of the Boca Raton Comprehensive Plan, which recommends: acquisition and development of park sites based on environmental, social, and economic considerations, preservation of historic and archaeological features, and minimal or no development or redevelopment in areas designated "preservation" in order to protect the most significant natural and cultural features. Immplementation of the Comprehensive Plan would satisfy the reasonable necessity requirement for public acquisition. The power of eminent domain might be unavailable to condemn land for a future purpose, unless the power is used to implement an adopted plan of acquisition and conversion of the land to the public use is reasonably imminent.

The existence of a Comprehensive Plan can provide the basis for a public acquisition program where the power of eminent domain might otherwise be unavailable. By amending the Comprehensive Plan to designate specific parcels of land for future open space use, the current status of land would be maintained until the landowner initiated negotiations for public purchase or inverse condemnation proceedings.

Non-Structual Measures Relating to Unique Agricultural Lands and Environmentally Sensitive Land

The principal impacts in the unincorporated portion of the study area are the continued conversion of productive agricultural lands to other uses. By not providing sewer service to Subbasins F and I and to unique agricultural lands, Alternatives 3, 7, 8, and 10 induce a lower rate of land development than the other alternatives. The selection of one of these alternatives would assure that Federal funds would not be used to promote the loss of unique agricultural and environmentally sensitive lands.

The non-structural mitigative measures addressed in this and the next sections could effect a significant limitation on the exercise of development rights. Adoption of a future land use plan element under the Florida Local Government Comprehensive Planning Act would be a prerequisite to successfully implementing a management program to protect unique agricultural and environmentally sensitive lands. The consistency requirement of the Act provides the legal basis for establishing a management system that limits the exercise of development rights. In Florida, conducting specific area studies, sometimes called neighborhood studies, sector studies, or critical area studies, has proven valuable in legally defending moratoria and conservation and environmental protection programs.

Area studies critically assess the different use-values and competing interests in a specific geographic area. They establish land management guidelines and principles to a much greater degree of specificity than those contained in a Future Land Use Element of the Comprehensive Plan.

In Metropolitan Dade County the Board of County Commissioners is empowered to declare certain lands to be "areas of critical environmental concern." In designating such areas, the Commissioners must specify by ordinance the boundaries of the area, the reasons why the particular area is a critical environmental concern to the County, the dangers that would result from uncontrolled or inadequate development of the area, and the advantages that would be achieved from the development of the area in a coordinated manner. The ordinances must also establish specific land use regulations, which may be in addition to any existing zoning, to ensure the protection of the area. The regulations provide environmental performance standards relating to such matters as site alteration, water control and flood protection, wastewater disposal and development clustering. The ordinances may also establish site alteration permit requirements and procedures for variances. In many respects, the County program is patterned after the "Areas of Critical State Concern" program contained in Chapter 380, F.S., the Florida Environmental Land and Water Management Act of 1972.

The Dade County program differs from the original State Act in the crucial aspect that the critical areas are designated by the County legislative body. Undertaking an area study should be considered as an aid in implementing a land management program.

Agricultural zoning is zoning to preserve agricultural use. As an exclusive use zone, permitted development in agricultural districts is restricted to farming activities. The classification permits farm-related housing and agricultural-oriented industry, such as mechanized harvesting, processing and packing procedures. To be effective, agricultural zoning should correspond to existing agricultural land holding pattern. For example, if the predominant character of holdings is fifty (50) acres, the agricultural zoning should establish a one (1) unit per fifty (50) acres minimum area requirement. The assumption is that current land holdings maintain farm productivity and economic efficiency. By applying an agricultural zoning classification to a specific area identified in an area study as unique agricultural land, agriculturally productive parcels might be assembled and preserved.

Agriculturally productive land may lie fallow because it is being held for development. Where necessary, down-zoning could induce the land back into agricultural use. Although intensive development of the land would be prohibited, the remaining agricultural use may afford a landowner reasonable beneficial use of the property. Generally, down-zoning is more legally defensible where the least amount of committed development is present.

Public acquisition of development rights can assist in assembling agricultural lands, especially where down-zoning is not useful. Development rights represent the development potential of the land. Development rights are purchased by the government, giving it the right to restrict that acreage to agricultural uses. Ownership of the agricultural land remains with the property owner, as does the right to use the property for agricultural purposes. Private markets for the purchase and sale of development rights to agricultural land are created by a Transferable Development Rights Plan.

Transferable Development Rights (TDR) is a concept that permits a shifting of density from land less suitable for development to land which is suitable for more intensive use. The conceptual basis of TDR is that the value of a parcel of land is measured by both its existing use and its development potential. Development potential for the purposes of TDR is determined by the maximum allowable density assigned to a particular tract of land. A TDR plan is established by a TDR ordinance designed to accomplish a particular objective. New York and Chicago enacted TDR ordinances to protect historic and architectural landmarks. The TDR Ordinance of Collier County, Florida is designed to preserve the semitropical swamps which comprise much of the undeveloped land in the County. Bucks County, Pennsylvania uses a TDR plan to preserve agricultural lands. The most effective uses of TDR have been to preserve environmentally sensitive and agriculturally significant land. A TDR plan can be designed specifically for the purpose of preserving unique agricultural lands.

Prior to enactment of a TDR ordinance, a planning authority would designate restricted zones and transfer zones. Restricted zones are selected on the basis of their agricultural significance. The development rights of property located in the restricted zones can be transferred to areas suitable for higher density use. The TDR ordinance would designate agricultural uses as the exclusive classification in the restricted zones. The amount of land which can be preserved for agricultural use is a function of the maximum additional dwelling units which a receiving area, called transfer zones, can accommodate. The maximum density the transfer zones can accommodate less their existing allowable density determines the maximum additional dwelling units that can be transferred. The maximum additional dwelling units are then allocated among the acreage in the restricted zones to determine the development rights ratio.

The development rights ratio is the amount of dwelling units attributed to each acreage of restricted lands. If, for example, there are 3,000 maximum additional dwelling units that can be accommodated by the transfer zones and 1,000 acres of land to be preserved, then the development rights ratio is three (3) dwelling units per one (1) acre of restricted land.

The development rights ratio is affected by land values. For a TDR program to work, landowners must be compensated for the loss of development potential. The value of the allocated dwelling units must equal the value of the lost development potential. In addition, the value of the development rights is determined by the ability of the transfer zone to absorb them. The transfer of development rights should be managed to avoid exceeding the capacity of the transfer zone.

Participation in a TDR program may be mandatory or voluntary. The TDR plan in Collier County, Florida is a mandatory program that has operated effectively since 1974. The Collier County Plan provides that owners of restricted land designated "ST" (Special Treatment) must apply for a development order before they can proceed with a plan of development. If the County finds the proposed use to be in conflict with the ecological balance to be preserved by the TDR ordinance, the development order is denied. The landowner is compensated for this loss of development potential by the issuance of development rights.

The holder of development rights can sell all or part of those rights on the open market or transfer the density to other parcels owned in the transfer zone. Development rights transferred to receiving parcels are recorded in the same manner as deeds or easements.

Title to the land in the restricted zone can remain with the original owner; however, it is subject to an agricultural use deed restriction. The deed restriction is created by the County and it is amendable to allow future generations to intensify the land use. In Bucks County, Pennsylvania, where TDR is used to preserve agricultural lands, the TDR ordinance provides landowners in the restricted zones with rights to develop one (1) house per twenty-five (25) acres, or the right to develop .5 dwelling units per acre in a cluster using ten (10%) percent of the parcel.

Marketability of TDRs is essential to the effectiveness of this program. If market analysis reveals that the demonstrated demand for TDRs is low, then the program should be designed to preserve only the most significant agricultural land in the study area. In defining the areas of most productive land, the economies of scale which accompany conventional farming techniques should be considered.

The designated environmentally sensitive lands are susceptible to environmental degradation. Uses should be permitted that do not adversely affect the productivity of the area. Productivity can be protected by establishing environmental performance standards and an environmental assessment requirement. Environmental performance standards identify the values that must be protected, but they do not necessarily provide how the results will be achieved. The following examples of environmental performance standards are taken from the Dade County Development Master Plan (1975):

> "The following guidelines are considered minimum guidelines and apply to all of Dade County except where a greater degree of protection is offered by a guideline with a specific environmental protection zone or subzone.
>
> Within impacted hammocks (40-60% exotic plants) construction is, to the maximum extent possible, to be confined to area characterized by exotic vegetation. A maximum 50% site alteration is permitted.
>
> Within all areas of allowable site alterations, the existing native vegetation is to be incorporated into the landscape plan of development to the maximum extent possible."

Environmental performance standards require the developer to demonstrate that the proposed development will not adversely affect the environmental integrity of the area. Maximum design flexibility should be allowed when incorporating the standards into the plan of development. An environmental or community impacts statement provides the mechanism for assessing the impacts of the project and achieving resolutions to internalize or mitigate those aspects. Impact analyses serve to rationalize the public purpose to preserve environmentally sensitive lands and the private purpose to make reasonable beneficial use of land.

Mitigative measures also include financial techniques and incentives to reduce adverse impacts. Financial techniques include the public acquisition by fee-simple purchase, purchase of development rights or purchase of easements to historic and archaeological sites and unique agricultural and environmentally sensitive lands. In certain cases, the public might acquire the development rights to prime agricultural land where a TDR plan is not useful. With the purchase of development rights or easements, ownership of the property remains in the private sector and on the roles.

Incentives can be provided to the public sector to encourage the voluntary protection of unique agricultural and environmentally sensitive lands. Incentives may accomplish the protection objectives without placing substantial costs on either the property owner or the local government. Incentives include tax relief and increased flexibility in site development, such as clustering, density transfer and density bonuses.

The most common form of tax relief is preferentially assessing agricultural land. This technique relieves some of the development pressure felt by the farmers who own land along the urban fringe, even though the tax advantage afforded agricultural land may be marginal. Further tax incentives are available under S704.06, F.S., which encourages the donation or sale of conservation easements. Conservation easements are perpetual interests intended to retain land and water areas in their natural, scenic, open or wooded condition to serve as suitable habitat for fish, plants, or wildlife. The sale of conservation easements is more attractive to the landowner than dedication of such easements. The tax advantages associated with conservation easements may be marginal when compared to the sale price of developable land.

The federal income tax laws encourage individuals and corporations to donate private resources to public use. Tax benefits are attainable through the long-term capital gains and charitable donation provisions of the Internal Revenue Code. By properly managing long-term capital gains and charitable donations, taxable income can be substantially reduced.

An out-right conveyance in fee-simple usually provides the greatest tax benefit to the donor. Restrictions on future use and management may be included in the deed of transfer. The retention of a life estate as part of an outright donation of land permits the donor to retain the right to live on the property for the rest of his life. If the donor reserves a life estate and the property is a personal residence or a farm, the value of the gift is discounted by the computed value of his life estate. Testamentary gifts, wills, and living trusts are methods by which a donor's wishes for use of the land can be carried out after his death. A donor's intent to protect the property may be accomplished through restrictions placed in the deed of transfer. Restrictions reflect the retention of certain rights and may decrease the fair market value of the transferred property.

A sale-and-leaseback arrangement involves the acquisition of land by purchase or gift and the subsequent leasing of the land to the grantor for a specific purpose. A bargain sale, which is a combination of selling and donating, or selling for less than full market value, can provide a federal income tax deduction equal to the difference between full market value and the actual selling price and may allow for a reduction in federal capital gains tax.

Mitigative Measures Related to the Provision of Community Services and Facilities

A development timing ordinance postpones the issuance of development permits until an area is adequately served by public facilities and services. Tied to a public capital improvements program, development proceeds in a logical pattern of phased growth. Applied to the unincorporated portion of the Planning Area, a development timing ordinance channels growth into those areas which are prepared for development.

Ramapo's (New York) development timing ordinance is the model. The Ramapo ordinance requires developers to apply for a "special use permit". The issuance of a "special use permit", authorizing residential development, is contingent upon the proposed development satisfying a fifteen (15) "development point" requirement. Development points are calculated and awarded on a sliding scale from zero (0) to five (5). The closer the development site is to the following public facilities and services, the higher the number of points awarded:

1. Public sewers or approved substitutes,
2. Drainage way,
3. Improved public park or recreational facilities, including public school sites,
4. State, county, or town roads improved with curbs and sidewalks, and
5. Fire houses.

The ordinance further provides for a public capital improvements program to be completed within a maximum of eighteen (18) years. Developers may accelerate the permitting of their site by providing the requisite facilities and services themselves. The Ramapo plan has received judicial approval from the New York Court of Appeals, the highest court in the state.

Local government authority to deny access to public facilities to control growth is unsettled in Florida. Alternatives 3, 7, 8, and 10 would deny service to Subbasins F and I and to unique agricultural lands. The Local Government Comprehensive Planning Act requires local governments to establish and implement a comprehensive planning program to guide and control future development. A development timing ordinance may be a permissible means of implementing a growth control plan.

Holding zones are barriers to intensive residential development. Agricultural zoning and large-lot zoning are means of establishing holding zones. Both types of zoning create low-density residential patterns of development, generally single-family homes on lots ranging from a minimum of one (1) to six (6) or more acres. Establishing holding zones reduces the rate at which agriculturally and environmentally sensitive lands are converted to more intensive uses.

It is most important that, once a Comprehensive Planning Program is in effect, the local governing body be consistent in the administration of its provisions. Community facilities and capital budgeting plans can never be effective if the timing and density of development is allowed to change because of development pressures. A local government in a high growth area which does not implement a development strategy keyed to its ability to provide needed facilities and services for this growth may have to force its citizens to bear the burden of ever-increasing taxes in an attempt to alleviate overcrowded facilities.

Implementation of mitigative measures may be limited by the legal doctrines of vested rights, equitable estoppel, and the "taking" issue. The doctrine of vested rights derives from provisions of the United States and the Florida Constitutions. It focuses upon whether a contemplated use has "ripened" into a property right. A property right cannot be destroyed or impaired by subsequently enacted land management regulations without due process of law.

The doctrine of equitable estoppel was incorporated as part of the jurisprudence of the United States and of the State of Florida. Equitable estoppel is raised as a defense to the application of land management regulations. To establish the defense, the developer must demonstrate that by relying in good faith or upon some act or omission of the government he has made such a substantial change in position or incurred such extensive obligations that it would be highly unjust to destroy the right he has acquired.

These doctrines may be invoked in an effort to defeat a land management program or the application of mitigative measures to a particular parcel of land. To protect a land management system from legal attack, it is important to clearly define the public purpose to be served; to carefully relate land management techniques to the public purpose; to continually refine the guidelines and standards for implementing the techniques. It is also important to base land use decisions upon competent data and to avoid legal contests by internalizing conflict within local administrative procedures. For instance, a vested rights determination should first be made by the local government at the administrative level rather than the judiciary. Local administrative processes should be established to attempt to resolve the issues without litigation.

Mitigative Measures Related to the Biscayne Aquifer

The implementation of Alternative 8 would lead to the increased discharge of treated wastewater to the Biscayne Aquifer. A continuing monitoring program would be required to determine any future need for further action.

Increased growth and development will occur whichever alternative is selected. This will lead to increased non-point sources urban infiltration to the Aquifer. Implementation of runoff controls presented in the Palm Beach County 208 Plan would be effective in mitigating these impacts.

Mitigative Measures Related to Increased Demand on Water Supply

The continued increasing demand on the areas drinking water resources has led to awareness in the area of the need for conservation. The installation of water saving devices for the home should be a top priority. Reuse of wastewater has been a part of several alternatives in this EIS. Some of these measures, such as spray irrigation within the City of Boca Raton and dual water systems, which are not now cost effective may become more viable in the years to come. Backpumping to the conservation area may also be a future possibility.

Mitigative Measures Related to 201 Facility Construction

The impacts of noise will be noticeable only during construction activities. Long-term impacts of noise will be associated with treatment plant and pump station operation but should be minimal. Construction impacts can be mitigated by:

1. Requiring sound control devices on construction equipment.

2. Limiting construction acitivities to normal business hours.

The major soil impact will be through soil erosion during construction. This impact can be reduced by:

1. Limiting the size of the pipeline corridor to the minimal possible areas of disturbance.

2. Prepare and strictly enforce construction plans which require the rapid stabilization and revegetation of construction areas.

3. Institute best management controls in order to reduce the amount of non-point runoff from construction sites.

There is a potential that undetected archaeological and/or historical resources could be present within areas of planned construction. Construction of pipelines could ruin the value of these resources. In order to mitigate or avoid any adverse impacts to historic and archaeological resources, a qualified archaeologist should perform a standard archaeological and historic sites survey prior to construction, if requested by the State Historic Preservation Officer and State Archaeologist.

A vegetative survey of all planned construction areas can help mitigate impacts to unique vegetative communities. This is a standard procedure in 201 projects.

CHAPTER IV - DESCRIPTION OF THE PREFERRED ALTERNATIVE

The underlying theme of this EIS is that the selection of a wastewater management program for the Southern Region of Palm Beach County should be compatible with the protection of the area's sensitive resources, particularly the unique agricultural land and the Biscayne Aquifer recognizing the extensive development pressure on this area.

In light of the impacts of growth and development in the Planning Area and the demonstrated lack of existing water quality problems, EPA has selected a modification of no Federal action as the preferred alternative. This approach as shown in Figure II-13 is described below.

EPA would fund the expansion of the Glades Road Facility to 17.5 MGD to serve subbasin A. Treatment at Glades Road would consist of secondary treatment using activated sludge. Disposal of wastewater would be by ocean outfall. Flow equalization of treated effluent would be employed at Glades Road in this alternative. A more detailed description of this alternative can be found in the 201 Plan. Present worth cost would be approximately $13.2 million.

EPA would not fund the provision of any wastewater facilities in the Palm Beach County portion of the Planning Area. Under this alternative, it is expected that the existing facilities will continue to be utilized and expanded with 100% local funding in the future.

The three County plants would probably remain in service until their capacities were reached between 1988 and 1990. These plants could then be expanded to 6 MGD each at the Sandalfoot and American Homes and .7 at Pheasant Walk with discharge to percolation ponds or to the City's ocean outfall. A third alternative for the County would be pumping all wastewater to the Glades Road Plant for treatment and disposal. An agreement would have to be reached between the City and County concerning the appropriate option for implementation. Approximate cost of County action under any of these options would be $21 million.

As part of this EIS, EPA is initiating a more detailed monitoring program to determine the impact of the percolation ponds on the Biscayne Aquifer. The Plan of Study for this sampling program is presented in Appendix A in this Draft EIS. The results of this study will be presented in the Final EIS.

Florida DER and the Palm Beach County Health Department will continue their monitoring programs at the percolation ponds and water supply wells in the future. If a buildup of nitrate levels becomes evident, an alternative form of wastewater disposal such as Boca Raton's ocean outfall, may become necessary. In this eventuality, Federal funding may be available to the County.

CHAPTER V - EIS COORDINATION

Part A: Introduction

Public participation is an important part of the EIS process. It provides for active public involvement beginning with the development of the EIS Plan of Study and continuing throughout the process to the actual publication of the Final EIS. In the Southern Region EIS, this process included coordination with local, regional, state, and federal agencies; the establishment of a Technical Advisory Committee; a Public Scoping Meeting; establishment of a Citizens Review Comittee; and a public meeting on the alternatives.

Part B: Coordination With Local, Regional, State, and Federal Agencies

Throughout the EIS process, many agencies were involved in the review of all interim outputs and the compilation of needed data. Most of this input was generated by the Technical Advisory Committee (TAC). This Committee met periodically throughout the study and provided input into such matters as implementability of the alternatives, environmental impacts of the existing outfall and percolation ponds, and the adequacy of the existing water supply for the projected population. Table V-1 identifies the members of the TAC.

TABLE V-1
MEMBERSHIP LIST
TECHNICAL ADVISORY COMMITTEE (TAC)

Robert E. George
Department of Commmunity Development
City of Boca Raton

Arthur G. Turner, Jr.

Richard D. Stalker
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Harry King
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City of Boca Raton

Norman Cortese
Arvida Corporation

Richard Gregg and Steve Reel
South Florida Water Management District

Warren Strahm and Herbert Zebuth
Florida Department of Environmental Regulation

Part C: Public Participation Program

Public Scoping Meeting

A public scoping meeting was held in Boca Raton on October 19, 1978 to explain the EIS process and discuss with the public the major issues which should be addressed in the EIS. The major issues raised by the public concerned the effects of providing wastewater facilities on growth and development and the pros and cons of various means of wastewater treatment and disposal.

Citizens Review Committee

The establishment of a Citizens Review Committee (CRC) was an important aspect of the Southern Region EIS public participation program. The CRC was formed with the express purpose of focusing the attention of local residents and public agencies on the EIS. The Committee consisted of 18 members and was representative of a cross-section of local interests. See Table V-2 for a list of the CRC members. Each member of the group was asked to review and comment on all study materials, as well as to offer any other input during the course of the study. Several Committee Meetings were held throughout the study.

The first meeting of the CRC was held on March 22, 1979. The major purposes of this meeting were to explain the role of the Committee in conducting the EIS and discuss the Plan of Study. There were no objections offered by the CRC members to the orientation of the EIS.

The next CRC meeting was held on August 1, 1979. The purpose of this meeting was to discuss the Draft Baseline Environment Task Report which had been distributed in early July. A videotape summary of the report was presented. Questions were raised concerning the approved 208 population projections and the effect of the EIS in controlling development in the Planning Area. It was explained that EPA has no authority or desire to control growth and development. This is the job of the local governments in the area. Several additional questions were raised concerning the alternatives to be considered for wastewater treatment and disposal. This issue was to be the major topic of the next few meetings.

TABLE V - II

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The third meeting of the CRC was held on September 12, 1979 to discuss the 201 Consultant's Alternatives Development Report. This report emphasized alternatives using the existing ocean outfall for disposal of wastewater. Numerous questions were raised at the meeting concerning the lack of detail explaining the conclusions of the report and the lack of consideration of more innovative means of wastewater disposal. Due to these concerns, two additional meetings were held with the CRC to discuss the development of alternatives. On September 19, 1979 the 201 consultant presented more details concerning his alternatives development work.

In response to the outcome of the two previous CRC meetings, a meeting of the CRC was scheduled by EPA on October 31, 1979 to describe the final list of alternatives selected for detailed evaluation. EPA expanded the list originally submitted by the 201 consultant to include alternatives involving the use of land application of wastewater for ultimate disposal. In addition, an expanded scope for the environmental evaluation of alternatives was discussed.

Two CRC meetings were held to discuss the detailed evaluation of alternatives. On April 30, 1980 the 201 Consultant's Evaluation Report was discussed; and on May 7, 1980 the EIS Consultant's Evaluation Report was considered. Both meetings produced wide-ranging discussions concerning the projected impacts of the alternatives.

Public Meeting on Alternatives

A public meeting was held on May 15, 1980 to receive public reaction to the proposed wastewater management system alternatives. Presentations were made both by consultants summarizing their work to date with emphasis on the detailed evaluation of alternatives. Comments from the public centered on the potential adverse impacts of population growth upon community services and facilities, particularly water supply; Palm Beach County Land Use Policy; and potential impacts of the ocean outfall.

CHAPTER VI - LIST OF PREPARERS

Project Personnel

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James Nicholas	Economist
Milledge and Hermeley	Attorneys
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Camp Dresser and McKee

Phil Moses	Senior Vice President
Robert Ortiz	Project Manager
Dan Anderson	Project Engineer

APPENDIX A - PROPOSED SOUTH PALM BEACH COUNTY SAMPLING PLAN

1. Samples should be taken from the effluent at the Sandalfoot and Pheasant Walk Sewage Treatment Plants, from the percolation ponds at these two plants, and from monitoring wells immediately down-gradient from the percolation ponds to be analyzed for EPA Priority Pollutants.

   Additional peaks on the chromatograph scan should also be tentatively identified and quantified. We suggest that each sample consist of two parts:

   a) a composite sample collected over a 24-hour period and analyzed for extractable compounds and pesticides.

   b) eight grab samples, taken every 3 hours for 24 hours, to be analyzed for volatile compounds.

2. Samples of ambient groundwater should be taken at each site. Grab samples from four wells located hydraulically up-gradient from each site, a total of eight samples, should be analyzed for EPA Priority Pollutants. Additional peaks on the gas chromatograph scan should be tentatively identified and quantified. Wells to be sampled can be chosen using USGS, South Florida Water Management District, DER and Palm Beach County records, along with existing maps of area groundwater flow. Wells should be of fairly uniform depth and construction. Information about well depth, locations and construction should be included with the analyses.

3. One sample of raw water should be taken from the Sandalfoot and Pheasant Walk water well fields and analyzed for the volatile EPA Priority Pollutants. Additional peaks on the gas chromatograph volatile scan should be tentatively identified and quanitified. This would allow a quick check of whether or not effluent was currently reaching the wells. The well in use closest to the percolation pond should be sampled.

APPENDIX B: NITRATE MONITORING RECORDS

TABLE B-1

SOUTH PALM BEACH UTILITIES

SANDALFOOT COVE PLANT

Monitoring Well Dates

(Nitrates - milligrams per liter)

	Well #1	Well #2	Well #3
December 1980	2.06	4.28	5.87
August 1980	1.00	4.34	3.13
July 1980	2.60	1.7	6.3

TABLE B-2

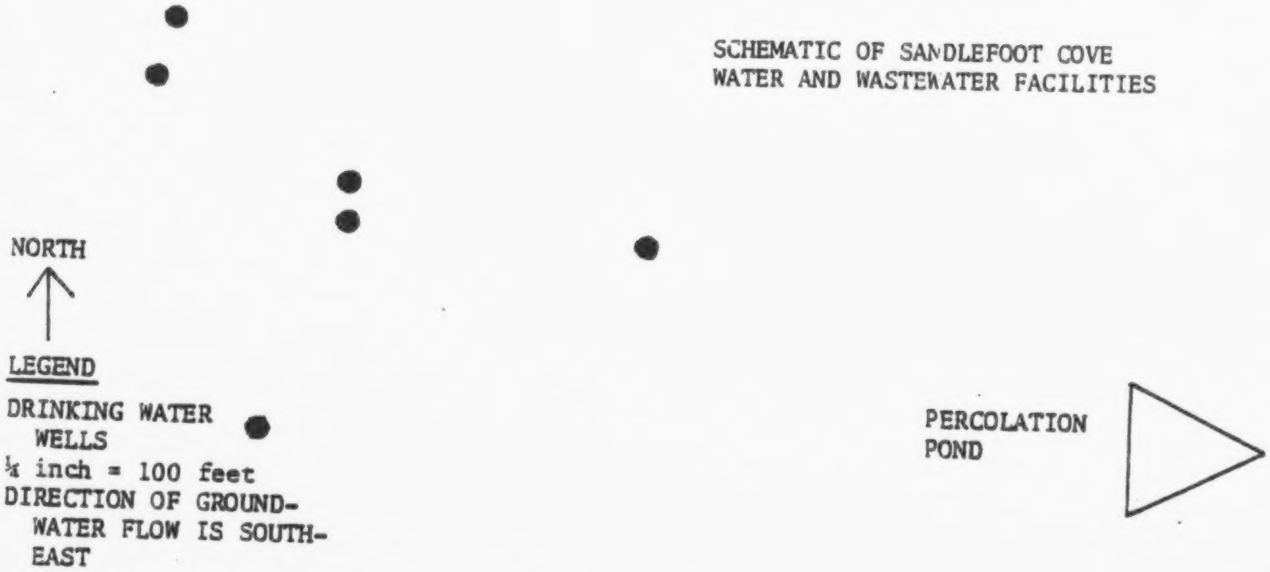
Sandlefoot Cove Drinking Water Well Monitoring Records

Nitrate Levels (mg/l)

Date	Well 1	Well 2	Well 3	Well 4	Well 5
4/13/77	0.03	LT0.01	LT0.01	0.02	LT0.01
10/24/77	0.09	0.06	0.06	0.24	0.02
2/14/78	LT0.01	LT0.01	LT0.01	LT0.01	0.29
9/1/78	0.12	LT0.01	LT0.01	0.26	LT0.01
2/15/79	LT0.01	LT0.01	LT0.01	LT0.01	LT0.01
9/13/79	LT0.01	LT0.01	LT0.01	LT0.01	LT0.01
3/6/80	0.10	*	0.10	0.10	0.10
9/18/80	0.29	0.29	0.33	0.33	0.36

LT less than

* No Measurement Recorded



SCHEMATIC OF SANDLEFOOT COVE WATER AND WASTEWATER FACILITIES

NORTH
LEGEND
DRINKING WATER WELLS
¼ inch = 100 feet
DIRECTION OF GROUND-WATER FLOW IS SOUTH-EAST
PERCOLATION POND

TABLE B-3

Pheasant Walk Percolation Pond Monitoring Records
Nitrate Levels (mg/l)

Date	Well 1	Well 2	Well 3	Well 4
9/25/79	0.8	0.5	0.4	2.0
10/16/79	6.1	0.5	0.3	0.5
11/14/79	6.9	5.9	9.2	5.5
12/18/79	2.7	0.5	0.2	0.2
1/15/80	1.1	3.0	2.8	0.9
2/11/80	0.7	0.1	0.5	0.8
3/9/80	0.8	0.1	0.5	0.2
4/16/80	1.9	1.0	0.2	0.6
5/13/80	4.8	0.5	0.7	0.4
6/10/80	7.1	*	*	*

* No Measurement Recorded

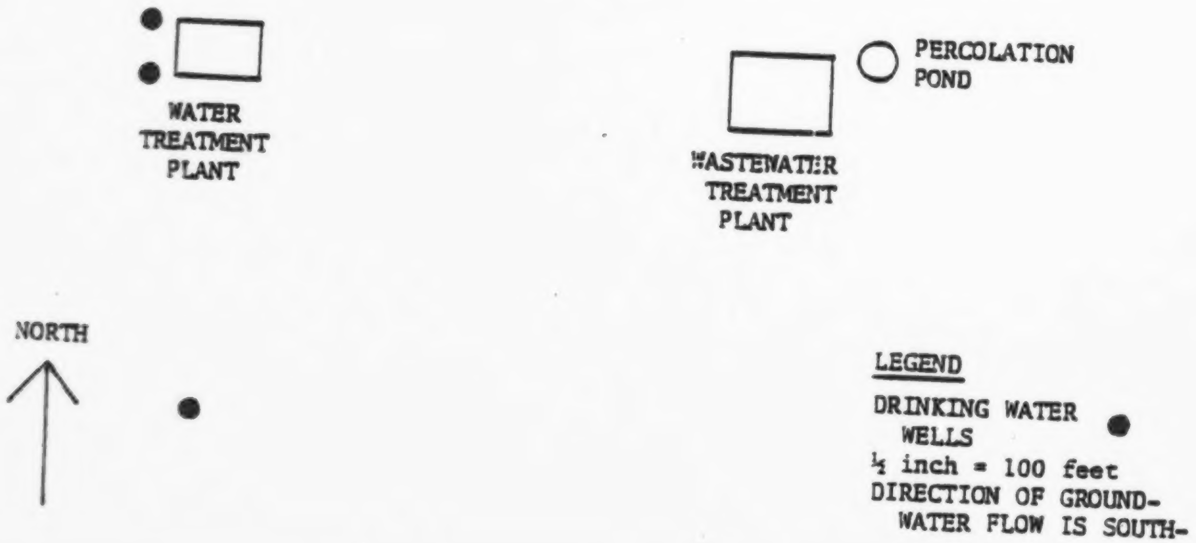
TABLE B-4

Pheasant Walk Drinking Water Well Monitoring Records
Nitrate Levels (mg/l)

Date	Well 1	Well 2	Well 3
9/77	3.2	7.1	*
9/78	2.6	2.6	4.4
3/79	3.9	7.9	*
4/79	0.2	0.2	0.1
9/79	7.9	3.1	*
3/80	3.6	*	*
4/80	*	*	4.3

* No Measurement Recorded

SCHEMATIC OF PHEASANT WALK WATER AND WASTEWATER FACILITIES


WATER TREATMENT PLANT
WASTEWATER TREATMENT PLANT
PERCOLATION POND
NORTH
LEGEND
DRINKING WATER WELLS ●
½ inch = 100 feet
DIRECTION OF GROUND-WATER FLOW IS SOUTH-

APPENDIX C - WILDLIFE OF SOUTH PALM BEACH COUNTY

Common terrestrial mammals that are likely to occur throughout the project area are Virginia opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), hispid cotton rat (*Sigmodon hispidus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), and raccoon (*Procyon lotor*). Examples of reptiles which occupy various habitats are green anole (*Anolis carolinensis*), glass lizards (*Ophisaurus* spp.), yellow rat snake (*Elaphe obsoleta quadrivittata*), and eastern coral snake (*Micrurus fulvius fulvius*). Mouring dove, bobwhite, and starling are examples of birds that may be found in many of the vegetative communities.

Whereas the species described above are typically found in a variety of habitats, other organisms such as the Florida mouse (*Peromyscus floridanus*), Florida scrub lizard (*Sceloporus woodi*), Atlantic loggerhead (*Caretta caretta caretta*), and scrub jay are normally found only in a single habitat type.

Except for a very limited amount of quail, deer, and waterfowl hunting, none of the terrestrial species are of direct economic importance, and the Florida Game and Fresh Water Fish Commission does not actively manage wildlife in the project area.

The AIWW and adjacent finger canals provide habitat for numberous estuarine and marine fish and benthic species.

Many of the species present such as sheepshead (*Archsargus probatocephalus*), jack crevalle (*Caranx hippos*), snook (*Centropomus pectinatus*), ladyfish (*Elops saurus*), tarpon (*Melgalops atlantica*), croaker (*Micropogon undulatus*), flounder (*Syacium* spp.) and pompano (*Trachinotus* spp.) are economically important as food or game fish for sport fishermen. Additionally, two mammaliam species are present from time to time--the bottle-nosed dolphin (*Tursiops* truncatus) and the endangered manatee.

Both the Mangrove and Maine Grass Bed vegetative communities occur in salt water. These two vegetative types provide the major extent of vegetative cover for reproductive and nursery areas for the fish species present. Although the extent of both of these communities has been seriously reduced by dredging and development of water front property, both perform a variety of ecological functions supporting the fauna present. Plant material in the form of detritus covered with protein rich bacteria is the primary food of many invertebrate species such as worms and crustaceans (shrimp and crabs), which in turn are eaten by larger organisms, such as sheephead, Altantic croaker, and flounder. The plants also provide cover for egg laying and protection from predators.

Benthic (bottom) habitats support a variety of invertebrate species. The substrate in these habitats is typically sandy to silty, and vegetation may be sparse or dense. The density of benthic organisms present ranges to over 500 organisms per quarter square meter, and lowest densities occur in the finger canals benthic organisms present are *Paraprionospio pinnata*, *Streblospio benedict*, *Ampelicca abdicta*, *Grandidierella bonnieroides*, and *Mulina lateralis*. Oysters are present in harvestable quantities, and clams to a lesser extent, but due to unpredictable bacteria levels, collection is illegal. Crabs in limited amounts are caught for human consumption.

The extensive canal system of the area serves as the most important freshwater fishery in the Planning Area, although biological productivity is relatively low. In descending order, the primary species caught by fishmermen are bream, including warmouth (*Lepomis* spp.), catfish (*Ictalus* spp.), largemouth bass (*Micropterus salmoides*), redfin pickerel (*Esox americana americana*), gars (*Lepisosteus* spp.), and mudfish or bowfin (*Amia calva*). However, the Florida Game and Fresh Water Fish Commission does not manage the fishery resources in the canals.[7]

The primary groups of benthic organisms in the mucky, peaty substrate of the canals are amphipods, gastropods, and aquatic insects such as dragonflies and damselflies. Although water quality varies greatly over an area the size of Southern Region Palm Beach County 201 Area, the benthos indicate that water quality is fairly good.

A list of rare, threatened, and endangered species that may occur in the Southern Region Palm Beach County 201 Area is presented in Table C-1. Many of the organisms in the list are ecologically restricted by fairly strict habitat requirements and have not been able to successfully cope with habitat modification, habitat loss, and/or man's presence. Many of the species in Table C-1 require habitats either in or adjacent to water (mangroves, beaches, marshes, etc.) or the dry, sandy scrub of the coastal ridge.

TABLE C-1

ENDANGERED AND THREATENED SPECIES OF THE SOUTHERN REGION PALM BEACH COUNTY 201 AREA

Species	Federal status[a]	State status[b, c]	Habitat and local status[d]
ANIMALS			
Florida gopher frog (*Rana areolata aesopus*)	----	Species of Special Concern	Sand Pine scrub habitats; range includes the project area.
Atlantic green turtle (*Chelonia mydas mydas*)	Endangered	Endangered	Marine and coastal strand; nests on beach strand of the project area during summer months.
Gopher tortoise (*Gopherus polyphemus*)	----	Species of Special Concern	Sand pine scrub, hammocks; historic range includes the study area.
Atlantic loggerhead (*Caretta caretta caretta*)	Threatened	Threatened	Marine and coastal strand; nests on beach strand of the project area during summer months.
American alligator (*Alligator mississippiensis*)	Threatened	Species of Special Concern	Marshes, swamps; relatively abundant in Florida
Peregrine falcon	Endangered	Endangered	Marshes, ponds, sloughs; winter resident.
Brown pelican	Endangered	Threatened	Marine and estuarine waters; although a permanent resident, it does not nest in Palm Beach County.
Bald eagle	Endangered	Threatened	Marshes, ponds, sloughs; does not nest in Palm Beach County.

TABLE C-1 (Continued)

Species	Federal status[a]	State status[b, c]	Habitat and local status[d]
American kestrel	----	Threatened	Semi-open areas; permanent resident of Palm Beach County.
American oystercatcher	----	Species of Special Concern	Coastal beaches, mudflats; rare locally along Florida's east coast.
Least tern	----	Threatened	Coastal beaches; nests colonially in Palm Beach County.
Florida scrub jay	----	Threatened	Oak scrub habitats; reported to inhabit Boca Raton area.
Roseate spoonbill	----	Species of Special Concern	Coastal bays, brackish ponds; does not nest in Palm Beach County.
Sherman's fox squirrel (*Sciurus niger shermani*	----	Species of Special Concern	Pine flatwoods; its range extends southward to the Boca Raton area.
Florida mouse (*Peromyscus floridana*)	----	Threatened	Sand pine scrub; recorded just north of Boca Raton.
Manatee (*Trichechus manatus latirostris*)	Endangered	Endangered	Marine, estuarine, and fresh waters. Observed in C-15 and Hillsboro Canals.[e]
PLANTS			
Leather fern (*Acrostichum danaeaefolium*)	----	Threatened	Reported from swamps, marshes, and mangrove swamps in the project area.

TABLE C-1 (Continued)

Species	Federal status[a]	State status[b, c]	Habitat and local status[d]
Bay cedar (*Suriana maritima*)	----	Threatened	Reported from coastal dune-dry sand habitats in the project area.
Shield fern (*Thelypteris interrupta*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Shield fern (*Thelypteris normalis*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Shield fern (*Thelypteris reticulata*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Air-plant (*Tillandsia balbisiana*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Air-plant (*Tillandsia fasciculata*)	----	Endangered	Reported from swamp and low hammock habitats in the project area.
Air-plant (*Tillandsia utriculata*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Sea-lavender (*Tournefortia gnaphalodes*)	----	Threatened	Reported from coastal dune-dry sand habitats in the project area.
Shoestring fern (*Vittaria lineata*)	----	Threatened	Reported from swamp and low hammock habitats in the project area.
Coontie (*Zamia integrifolia*)	----	Threatened	Reported from pine/oak scrub habitats in the project area.

TABLE C-1 (Continued)

Species	Federal status[a]	State status[b, c]	Habitat and local status[d]
Pondapple (Annona glabra)	----	Threatened	Reported from swamps in the project area.
Blechnum fern (Blechnum serrulatum)	----	Threatened	Reported from low hammock, pine flatwoods-dry prairie, and wet prairie habitats in the project area.
Lance fern (Campyloneurum phyllitidis)	----	Threatened	Reported from low hammock and swamp habitats in the project area.
Sand cedar (Ceratiola ericoides)	----	Threatened	Common in pine-oak scrub in the project area.
Shell orchid (Encyclia tampensis)	----	Threatened	Reported from swamp habitats in the project area.
Redberry (Eugenia confusa)	----	Threatened	Reported from coastal hammock habitats in the project area.
Dahoon (Ilex cassine)	----	Threatened	Reported from swamp habitats in the project area.
Golden polypody (Phlebodium aureum)	----	Threatened	Occurs in coastal hammock, low hammock, and swamp habitats of the project area.
Resurrection fern (Polypodium polypodioides)	----	Threatened	This abundant species is known from swamps and low hammocks in the project area.
Palmetto (Sabal palmetto)	----	Threatened	This abundant species occurs in coastal hammocks, low hammocks, and swamps in the project area.
Scaevola (Scaevola plumieri)	----	Threatened	Reported from coastal dune-dry sand habitats in the project area.

species which are on the federal list of endangered es either reproduce or are permanent residents in the ing Area--the Atlantic green turtle (*Chelonia mydas*), the brown pelican, and the manatee. Two endangered , the peregrine falcon and bald eagle, probably occur in area intermittently. In addition to the endangered es, two threatened species occur. The Atlantic loggerhead *etta caretta caretta*) nests on the beaches, and the an alligator (*Alligator mississippiensis*) is a permanent nt in canals, swamps, and marshes.

maining animals in Table C-1 are classified as threatened special concern in the state of Florida (Florida Statutes r 39-27). These species are provided legal protection by orida Endangered and Threatened Species Act of 1977, as as such individual acts as the Florida Panther Act, a Manatee Sanctuary Act and Endangered and Threatened s Trust Fund Act. These laws prohibit any activity which detrimental to listed species unless authorized by from the Florida Game and Fresh Water Fish Commission.

deral list of endangered species names no endangered and eatened plants for the Planning Area (U.S. Fish and e Service, Department of the Interior 1979a, 1979b). , a number of plant species that are likely to occur in nning Area are protected by the Preservation of Native f Florida (Florida Statutes Chapter 78-72, Section 1, 581.185).